

*design for*  
**tacit learning**

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**Appendix I.** *Multimedia Archive of Traditional Craft Skills* report on first semester's research May 2002

**Appendix II.** Analysis of basket making course video

**Appendix III.** Analysis of bread making course video

**Appendix IV.** "Cardboard computer" model of slide whistle learning resource

**Appendix V.** Sample questionnaires

## 1. Introduction

There is increasing interest and activity in the design of interactive multimedia to support learning in all fields of education and training. However, most of the theory to support such developments is concerned with learning explicit knowledge and there is little guidance available to designers of material for learning in areas with an element of tacit knowledge such as craft skills. The aim of this project is to study learning in traditional rural crafts with the intention of developing a methodological framework for the design of multimedia-based learning in all areas of craft knowledge. It could also have applications in such diverse fields as healthcare, performance, catering, construction and sport.

To gain greater insight into learning in a craft context, I observed courses run by two traditional craft practitioners who are also experienced teachers. Relating these observations to previous research I have undertaken into learning theories (appendix I) lead me to conclude that the teaching methods utilised on the bread making course and the early part of the basket making course correlated with constructivist learning and provided a suitable model from which learners could acquire the tacit element of a craft skill.

A review of literature in the fields of surgical skills training and educational psychology identified further elements that could be seen in the craft learning and could be added to the structure of the learning resource. The learners firstly need a cognitive phase where they are passive and observational and gain an overview of the complete task with any common key skills and strategies. Next they require an associative phase where they are active and participative and undertake the task as a series of critical steps with associated common errors. Finally, and most importantly for the tacit element of the skill, the learners must address the autonomous phase where they master the skill through repetition. To enable the learners to achieve this they need the facility to evaluate their outcome, identify and solve any problems, and the encouragement to repeat the task.

This theoretical framework was then used to construct a prototype multimedia resource for the making of slide whistles which was evaluated and progressively developed with a variety of learners. In addition to observing the learners, questionnaires were used to evaluate the learners' levels of skill and to provide structured feedback on their learning experience.

After evaluation I surmised that the basic structure of the learning resource had proved sound, but a major issue was encountered with some learners proving

impatient to move to the associative phase without first addressing the cognitive phase. This was overcome by withholding access to the instructional text and images until after the explanatory video had been fully played.

I conclude that the model of constructivist learning developed through the observation of craft teaching produced an effective framework for the construction of a simple multimedia learning resource. It seems that the essential part for gaining the tacit portion of the skill is achieving sufficient repetitions to enter the autonomous phase of learning and this can be facilitated through the provision of solutions to common errors and a final evaluation section, though further testing of this concept on a more complex skill is needed. A further outcome of the project was the identification of a workable template for data gathering for evaluating the learning/teaching of practical activities.

## 2. Methodology

My previous research (appendix I) started with an extensive literature review with the aim of establishing the current state of knowledge of the design and evaluation of educational multimedia learning resources. This was followed by a short empirical study; the observation and analysis of a learner using video as a self-directed learning resource to construct a craft skill. The result of this piece of work was to highlight the problem that video as a learning resource in isolation does not make a good medium for acquiring tacit knowledge and provide the question addressed by the first part of this report; how does an experienced craft practitioner teach skills involving tacit knowledge and how could this be provided by a multimedia learning resource?

Empirical studies formed the groundwork for this report; observing courses taught by two craft practitioners who are also experienced teachers. Digital video was used to provide a permanent record of the proceedings and the video was copied onto DVD to allow in-depth analysis. In addition I took handwritten notes, particularly looking for elements that might be missed by the video recording and combined these observations with the video analysis (appendices II & III). To triangulate the data interviews were recorded with both the teacher and the learners using a digital dictaphone again to provide a permanent record and to allow easy analysis. These records were used both to verify observations and to highlight new elements of particular relevance.

Whilst it would have been useful to also have experienced the courses as a learner, it did not seem possible to be both learner and observer at the same time. Instead both courses were attended by a learner who is familiar with my project and with whom I was able to have in-depth interviews before and after the courses. This enabled me to gain more of the learners perspective of the learning experience whilst remaining a full-time observer.

The analysis concluded with the drawing of the flow charts based on the observations of Socratic and constructivist learning (figures 1 & 2) and the decision to proceed with the constructivist theory as a base for the resource.

The next stage of the research consisted of a much smaller literature review, specifically looking at research into the design of multimedia for learning surgical skills, which has many parallels to craft learning, having traditionally been taught through apprenticeship, but now increasing use is made of computer technology. Following up references in the bibliographies of these papers, lead me to an area of

educational psychology that I had previously not discovered; phases of learning (Fitts & Posner, 1967). Re-considering the structure of the courses in the light of this reading added depth to my understanding of the processes the learners were going through and enabled me to complete my learning resource framework (figures 5 & 6).

Finally, I wished to test this framework, by using it to construct a pilot multimedia learning resource and refine it using iterative design; a repeated cycle of designing, testing and redesigning. My initial plan had been to use the bread making course as a subject for the learning resource, following the structure used by the teacher. This soon proved far too complex and cumbersome, particularly as I started the design straight away on Macromedia Director, then found fundamental changes needed making which involved a huge amount of work.

I then chose a much simpler task, the making of a wooden “slide” whistle, and started by learning how to make them myself. By largely constructing my own knowledge without the aid of a teacher and taking extensive notes and photographs as a record, I was able to gather and organise the information I needed for the learning resource. This time, the first stage design was produced on paper, inspired by the “cardboard computer” methods of Ehn and Kyng (1991) and the design modified with the assistance of an experienced and relatively novice learner.

This modified design was then produced using Macromedia Director and evaluated, modified and re-evaluated several times with different learners. As with the courses, my evaluation was largely based on observational data gathered by taking notes as the learners used the resource and at a later stage of the testing I used questionnaires to help evaluate the learners levels of skills and to gather post-test feedback. In an ideal situation, the observational data would also have been supported by video-recording, but time constraints lead me to abandon this plan, as it takes time both to “stage manage” the tests so they can be video recorded and to process and evaluate the video afterwards.

### 3. Background

In the past rural crafts were taught through apprenticeship, either formally or informally, handed down through the generations by working alongside an experienced craftsman. As this practice has gradually died out, the skills have gradually been lost or remain in the hands of just a few practitioners, many of whom have little or no knowledge of teaching their craft.

There seems little likelihood of a return to an apprenticeship system, but there is much interest from an increasing number of “independent learners”, whose learning is self-directed and who are motivated by internal incentives and curiosity (Durbin 2002). They may have some opportunities to study for short periods with experienced craftsmen but this is not sufficient for them to develop a useful level of skill and they need for materials for independent learning.

Research into the design of multimedia resources for learning explicit knowledge (Laurillard *et al* 1998) identified the following affordances for learning:

*Navigation - to make the narrative explicit*

*Goals & sub-goals - to provide motivation*

*Interaction - so the learner expresses their knowledge*

*Model answers - so the learner refines their knowledge*

My earlier research (appendix I) with a learner using an educational video to learn a craft skill showed that navigation and goals in this context were just as applicable and expression of knowledge was straight forward as the learner instinctively engaged with the task. A far greater problem was providing the learner with a “model answer”; in this context the ability to judge how well the task had been undertaken and how to improve the outcome.

## 4. Learning from a craft practitioner

To gain insight into learning in a craft context, I selected two traditional craft practitioners who were also experienced teachers and attended courses run by them as an observer. My key areas of interest were how the teachers structured the courses, how they dealt with the problem of understanding their own tacit knowledge and communicating it to their learners, and how the learners expressed and refined their knowledge.

### 4.1. Owen Jones - oak swill basket maker

The oak swill is a traditional Lake District basket, once widely used in industry and agriculture as it is exceedingly strong and durable. Owen Jones is now the only person in the UK to make these baskets and has taught more than 50 three-day courses over the past 12 years.

During the course, the learners go through each process in preparing the materials and make their own basket, though due to time constraints not every process can be completed in the correct order and the baskets are woven largely from pre-prepared material. His aim is for each learner to complete a basket and gain a good feel for how it was made. He feels that three days is insufficient to gain enough skill to make another basket unaided and offers his learners the opportunity to spend more time working with him after the course to improve their skills, but so far none of them have done so. He feels this is because most learners are hobbyists and cannot spare the time needed to work with him to gain the level of skill they would need to then be able to work unaided.



*Oak swill basket*



Analysis of the video observation (Appendix II) revealed that Owen adopted differing teaching styles for the two parts of the process. The first part, where the learners prepared the oak to weave the basket from, involved many subjective decisions and a large proportion of tacit knowledge and at this stage the learners were allowed the freedom to construct their own knowledge.

Owen would demonstrate the task, discussing strategies to adopt and common errors made, and then allow the learners to attempt the task. He offered advice when asked and offered explanations if he observed errors, always attempting to make clear the thought process he was going through. He made it apparent that there were no clear-cut decisions, but a wide range of acceptability and at each stage allowed pieces that were on the boundaries to go through to the next stage so the learners could experience first hand the difficulties they could encounter.

The technique of weaving the baskets has been developed over hundreds of years and Owen did not allow the learners to make any variation to this part of the process. This was partly through a sense of tradition, as he has hardly deviated from the way he was taught, and partly through a desire to ensure each course member made a good basket.

Again he started by demonstrating each step and then letting the learners proceed, but if they encountered difficulties he had a tendency to solve the problem for them whilst making an explanation, rather than allowing them to make the correction themselves. At no stage did he allow the learners to proceed with an error and encounter the consequences.

Differing learning styles immediately became apparent as the learners varied greatly in the confidence with which they commenced each step. The more confident, particularly those with experience in similar crafts, were keen to undertake the practical work, only calling for guidance from the teacher when obvious problems were encountered. Particularly during the weaving process, when the learners had the tools and materials in their hands, they were keen to undertake the step before the teacher had finished demonstrating. Owen frequently had to ask them to observe the complete process before commencing. The less confident were not only those with fewer practical skills, but also some who seemed naturally more cautious. They frequently required further attention from the teacher before they would embark on a step and called for more frequent reassurance whilst working. In all cases once a step had been completed, the learners called upon the teacher to judge their work and,

where repetition was possible, they could be seen to be growing in confidence as they became more able to judge their work themselves.

#### **4.2. Ana Balfour - traditional bread making**

Ana Balfour owns and runs a traditional watermill and has run courses for the last 10 years to teach people about traditional flour and how to bake with it. The flours she produces are very different to modern commercially-available flour and baking successful bread involves making a series of subjective decisions and a high proportion of tacit knowledge.

Her teaching style was to allow the learners to construct their own knowledge, encouraging group discussion to build confidence and aid decision-making. Initially she demonstrated the whole process, pausing frequently to allow the learners to feel, smell and listen as appropriate. She attempted to make her decision-making process clear and to show the range of variation that was acceptable.

The learners then took it in turn to make their own loaves with the rest of the group watching and Ana asked for group input to help with the subjective decisions before expressing her opinion. The result was that, although the learners only made one loaf each, they experienced the decision-making for 5 or 6 loaves. Once baked, a selection of the loaves were tasted to further a discussion on the outcome.

At the end of the course Ana emphasised the need to start bread making at home as soon as possible whilst the knowledge was still fresh in their minds and encouraged baking little and often whilst they built their skills and learnt to adapt their technique to their situation.

Again differing learning styles were observed with the two learners with existing knowledge of bread making showing a tendency to progress with what they knew without stopping to ask Ana or confer with the group. Of the three who had not made bread before, one seemed reasonably confident to move ahead with minimal affirmation that he was progressing correctly. The other two had a greater need for feedback and frequently asked for support or guidance, both from Ana and other group members.

### 4.3. Theory from observations; Socratic dialogue

Whilst teaching how to weave the baskets, Owen Jones adopted the position of a master dictating to his apprentices how a task was to be done. As discussed in my previous research (appendix I), this teaching style is known as a Socratic dialogue where the teacher is in a dominant position with control over the subject and bestows knowledge upon the learner, selecting from the material and passing on what he sees fit (Cook 2001).

To summarise the learning process observed during Socratic dialogue:

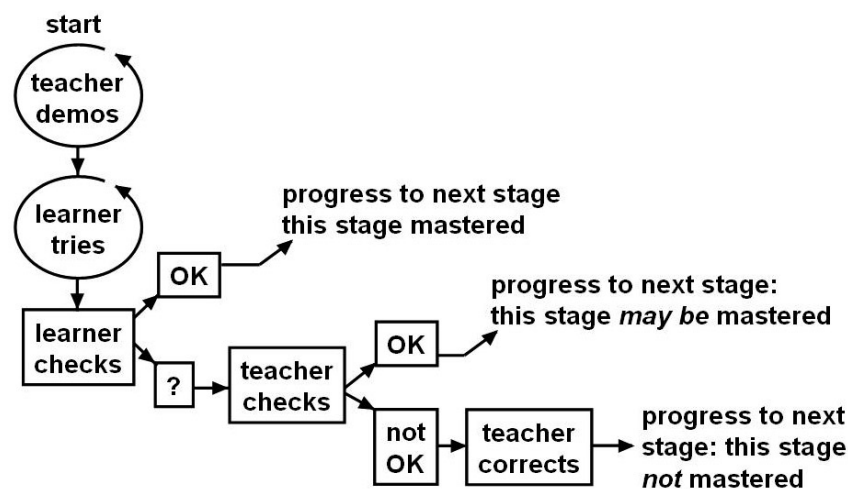


Fig 1. Socratic dialogue

In the traditional apprenticeship situation this would happen out of necessity as the master would have to ensure production of a saleable product, but the learner would go through each process many times until all stages were mastered and the necessary tacit knowledge acquired to proceed without assistance. There must also have been a tendency for the learner to end up with a good mastery of what to do, but not necessarily an understanding of why.

On the basket making course this teaching style occurred partly because Owen never varies the design himself, but also because he knew this would guarantee success and he wanted his learners to take home a useable basket. The unfortunate outcome was that, because the learners only had the time to go through each process once, they did not master all the stages and made little progress with the acquisition of the tacit knowledge required to make a basket without further help.

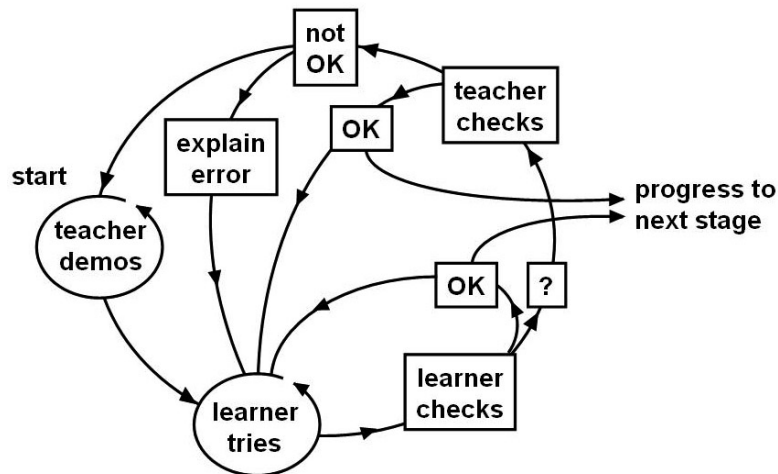
#### 4.4. Theory from observations; Constructivist learning

In the preparation of the weaving materials, Owen Jones allowed the learners to experiment with techniques and experience the consequences of their own mistakes. Ana Balfour also adopted this more open approach in the teaching of bread making, though she also used group discussion to encourage correct decision making. As shown in my previous research (appendix I), this constructivist learning places the learner in the dominant position and the teacher's role is to provide "scaffolding", supporting the learner until they can proceed unaided (Yazici et al 2001). The way in which the learner constructs knowledge depends on the learner's preferred learning style and the complexity of the task, with a range from pure discovery for simple tasks, to an increasing need for guided discovery for increasingly complex tasks.

The difference between guided discovery in constructivist learning and Socratic dialogue are best illustrated with examples from Owen Jones course. Whilst preparing materials, when a learner asked for assistance with a process, Owen took the tool and piece of wood and showed the action to be performed *without actually doing it*, then gave it back to the learner to complete, simply guiding the learner's discovery. In contrast, when a learner asked for help when weaving the basket, he would take the tool and basket and *complete the task himself* whilst offering an explanation for what he was doing, without letting the learner experience the process.

Ana Balfour's constructivist technique was a little different because the bread making process offered the learners the opportunity to correct certain errors as they progressed. She encouraged the learners to stop, think and discuss with the others at key stages, for example to decide if their water was at the correct temperature before putting it in the dough, or if the dough was too wet or dry before starting to knead. Only once the group had discussed the issue would Ana express her opinion.

To summarise the learning process observed during constructivist learning:



*Fig 2. Constructivist learning*

As the learners are now in control of the process, they progress at their own rate, make their own decisions about whether a stage is mastered or needs repeating and should be able to acquire the tacit part of the skill. There is still the potential for the over-confident learner to proceed thinking all is well, but actually in error when more complex support will be needed from the teacher to allow them to back-track and trace the mistake.

#### **4.5. Conclusion**

The multimedia learning resources I wish to build a framework for are to be used by self-directed learners without the guidance of a teacher. In this respect the constructivist learning model seems to offer the best opportunity for the learner to achieve the repetition necessary to acquire tacit knowledge. The design will have to be mindful of the tendency of some learners to move ahead without checking sufficiently that a stage has been correctly completed.

## 5. Further literature review

Following the observation and analysis of craft teaching, I returned to a literature review, primarily with an interest in the field of surgical skills training which traditionally was taught through apprenticeship, but where now an increasing use is made of computer-based training. The surgical skills research then lead me to read more in the area of learning psychology, which again added depth to my understanding of my observations of craft learning.

### 5.1. Surgical skills

Traditionally, surgical training has also been taught through apprenticeship, learners watching and assisting, and taking an increasingly active role as experience increases. The traditional type of open surgery, largely reliant on simple hand-eye co-ordination, was straight forward to learn through frequent repetition, but minimally invasive techniques have now become more common and are more complex to learn, relying on more subtle perceptual-motor skills (Tendick *et al* 2000). As most of this surgery is performed with a laparoscopic camera supplying images to a TV screen, computer-based training that simulate the processes have been developed. Much of the research has developed increasingly sophisticated virtual reality training models not so relevant to this work, but the basic analysis of surgical skill and the underlying structure of the computer-based training are both of use.

Early experimental training resources that attempted to simulate entire operations were cumbersome and deemed to be less effective than watching and participating in live operations (Tendick *et al* 2000). Instead, it was identified that in every operation there were a series of key actions which, if performed incorrectly could lead to complications. More effective training resources were then developed, concentrating on these critical steps and common errors for each procedure which, along with the basic strategies and key skills required to perform the task, could be defined by a skilled surgeon. Attention was drawn to the fact that a skilled surgeon also uses perceptual-motor and spatial skills that cannot easily be expressed verbally or reproduced by a training resource (Feygin *et al* 2002). These play an important role in the tacit element of the skill and specific resources were being designed to address them.

The analysis of surgical skill can be seen to correspond to the observed teaching of craft skills where the teachers taught complex procedures as a series of critical steps and, whilst demonstrating them identified common errors that may occur. In the more complicated process of basket making, Owen Jones periodically taught key skills and

strategies that were common to a group of steps to be undertaken. For example, prior to the learners splitting sections of oak into the long, fine lengths required for weaving, they practiced the techniques on short lengths of what would otherwise have been waste wood. This allowed the learners to become familiar with the tools and gain an understanding of how the material they were handling would behave on a simple task before embarking on the real task which was relatively difficult to learn.

## 5.2. Phases of learning

Fitts and Posner (1967) identified three distinct phases that a learner moves through as they master a skill; cognitive, associative and autonomous. The cognitive phase is the passive, observational stage where the learner acquires an understanding of what will be required. The associative phase is the active, participative stage where the learner determines how to execute the task in hand. The autonomous phase is the repetitive part where the task gradually becomes automated and is eventually mastered. This is the phase a learner must reach to acquire tacit knowledge.

Again, this can be seen to correspond to the observations of the way the basket and bread making courses were structured and can also be tied in with the elements identified in the surgical skills research:

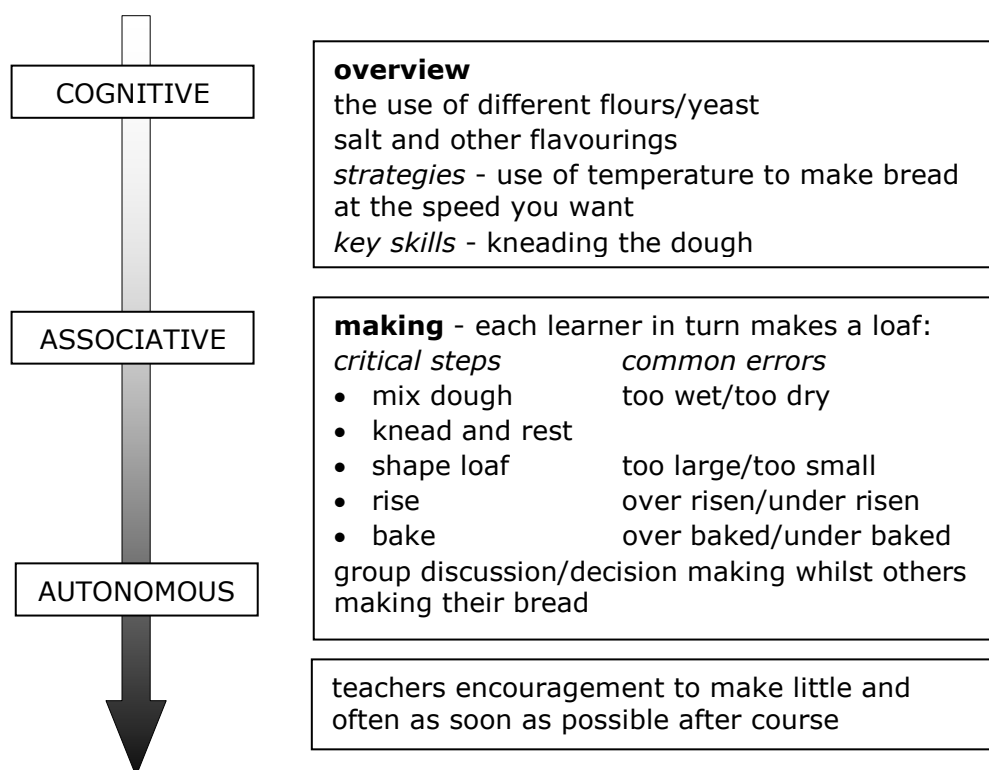


Fig 3. Bread making phases of learning

Firstly considering the simpler task of bread making, Ana Balfour could be seen firstly to take the learners through the cognitive phase of learning, showing them the complete process whilst they just watched, and at this stage key skills such as kneading and strategies, such as using temperature to speed up or slow down the process were introduced. At the associative phase the learners made their own bread with Ana dividing the task into critical steps and discussing common errors. During the short course the autonomous phase was not achieved, but some repetition was possible through group interaction whilst other learners were making, and Ana stressed the need for learners to bake little and often as soon as possible after the course.

Whilst the basket making process was more complex, these phases could still clearly be identified, but operating at different levels. Owen Jones had divided the making into several steps, each of which was then sub-divided, giving a series of critical steps within critical steps. If a set of steps had strategies and/or key skills associated with them, then these were discussed at the introduction to that set of steps at a more general cognitive phase. The learners then progressed through the critical steps, at the cognitive stage watching a demonstration (with possibly further strategies and/or key skills) and at the associative phase they undertook the task themselves, learning the common errors related to it. For the parts of the process where repetition was possible, particularly during the preparation of the weaving materials, the learners entered the autonomous phase where they started to gain the necessary perceptual-motor and spatial skills necessary to master that step.

*Fig 4. Basket making phases of learning (see page 16)*



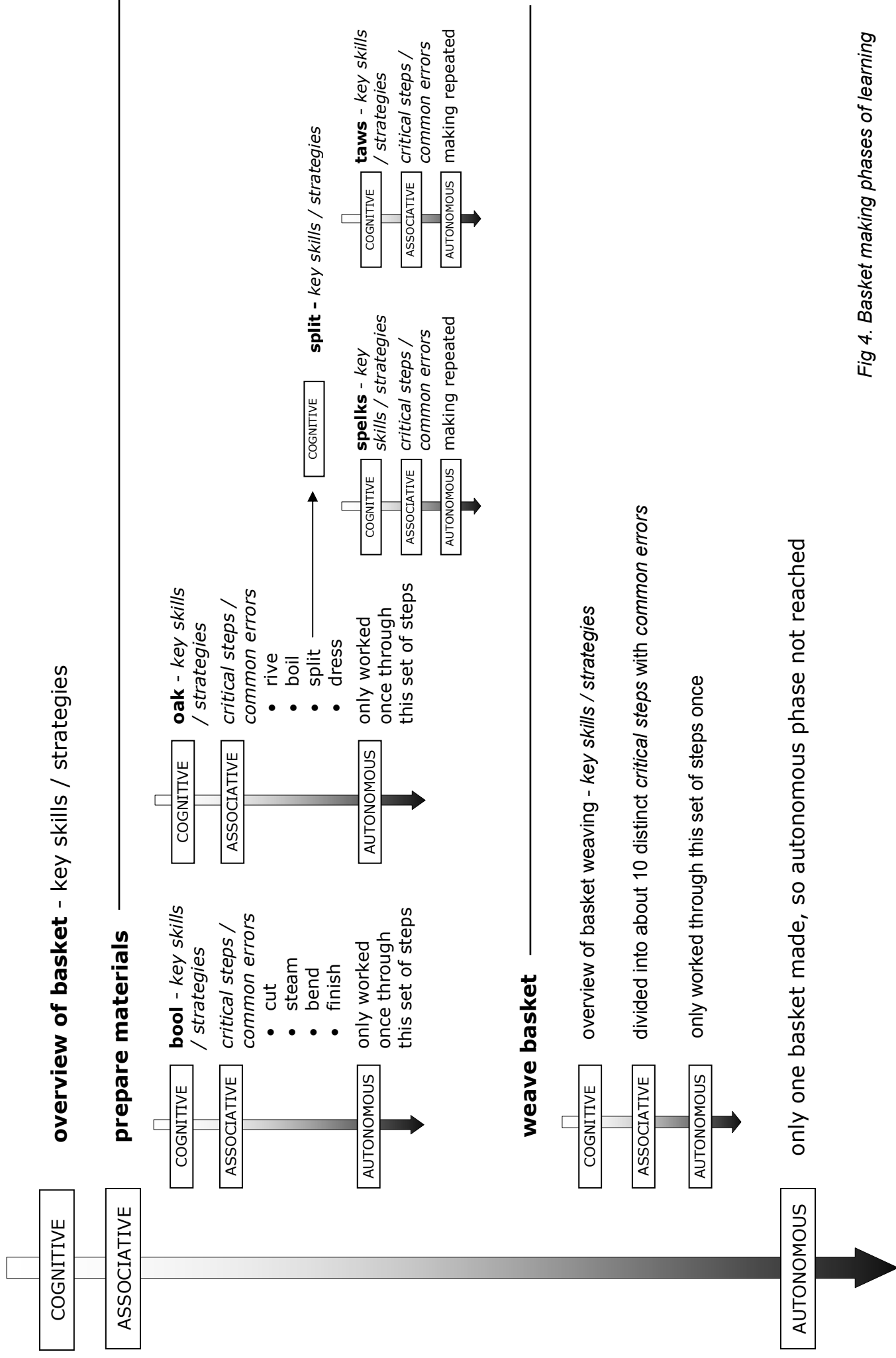
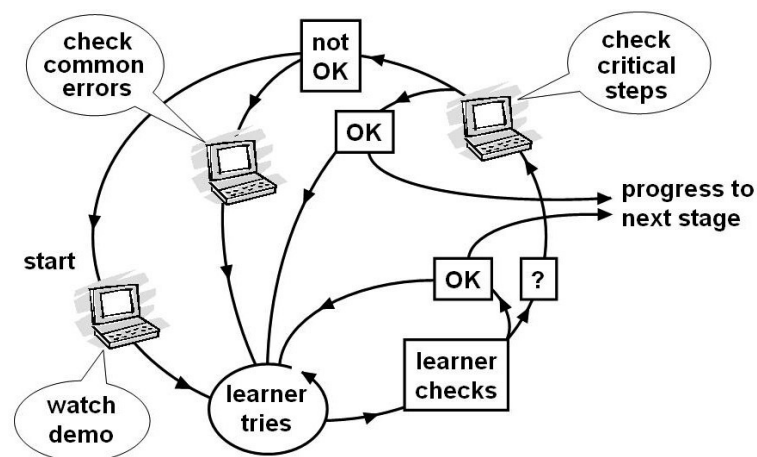


Fig 4. Basket making phases of learning

### 5.3. Multimedia learning resource framework

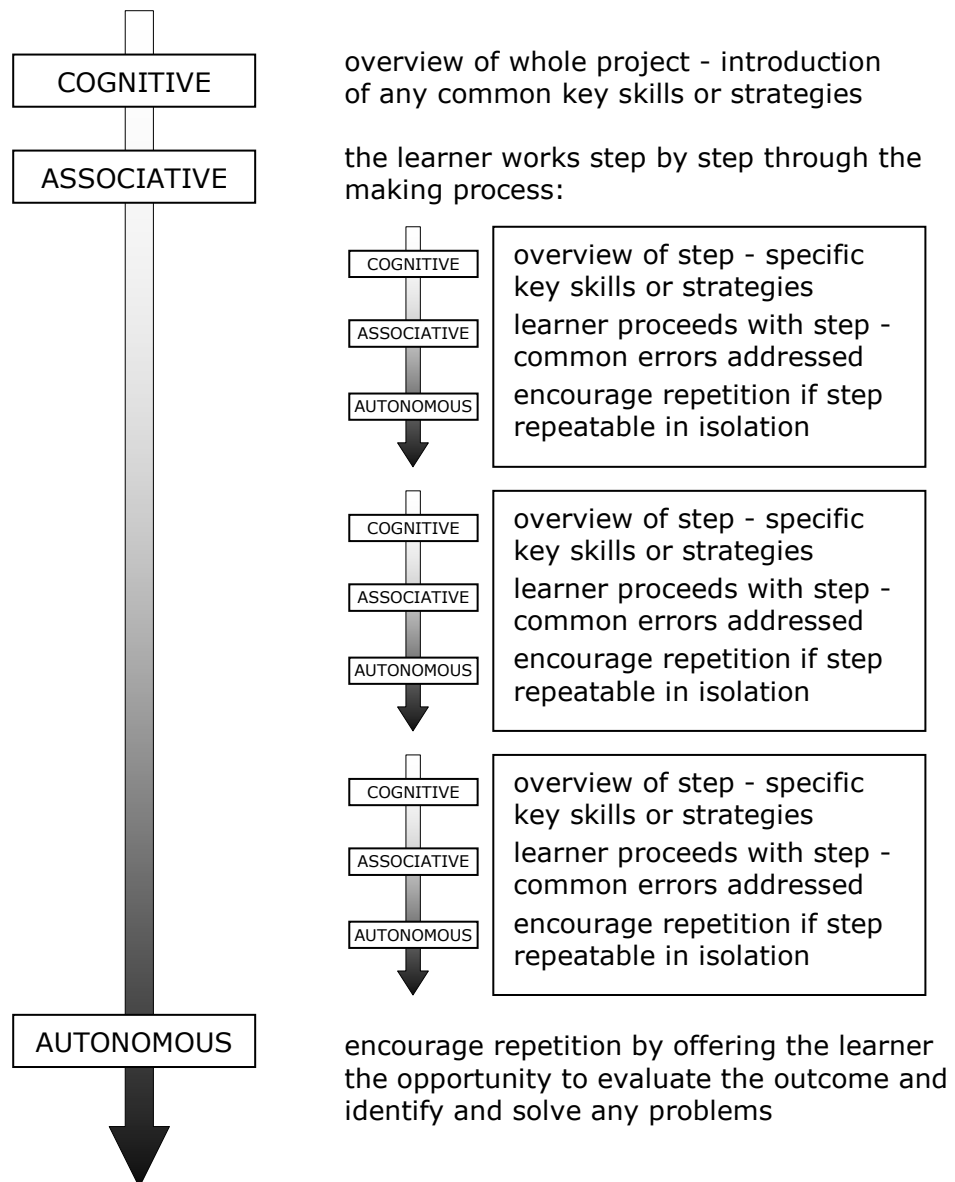
Considering figure 2, the flowchart of constructivist learning, in the light of this research suggests that the learner will need to work around such a loop for each critical step in the process. As the teacher will no longer be available, the learning resource will also need to emulate the feedback provided by the teacher for each step, thus:



*Fig 5. Constructivist method using multimedia for critical step*

The cognitive phase is addressed by the introductory demonstration showing what the complete step entails. The associative phase is then entered as the learner attempts the task and has access to the solutions for any common errors that might occur. The autonomous phase will be entered when the learner achieves sufficient repetitions of the step and encouragement to do this must be provided by enabling the learner to evaluate their outcome and identify and solve any problems.

In addition, the learning resource will have to address the phases of learning for the whole process, initially giving an overview of the project and introducing any common strategies or key skills to provide cognitive understanding. Then the learner will move step by step through the making process, at the associative phase for the whole project, but within each step the cognitive and associative phases will also be addressed for that step and potentially the autonomous too if it is a repeatable task in isolation.



*Fig 6. Constructivist method using multimedia for whole project*

Finally, when addressing the issue of the over-confident learner with a tendency to move ahead without sufficiently checking that each critical step has been correctly completed, it seems reasonable to assume that such learners will view the learning resource with a similar degree of confidence and when they reach the stage of realising their error, will wish to back-track to locate the problem. Laurillard (1996) identified the importance of effective navigation to the learners in this context; they need to be able to see the narrative structure of the learning resource and easily move within it. This is of particular importance to a complex, multi-stranded resource, but even at this level the navigation will need to allow the learner to easily see where he is within the resource and either move directly back to a particular stage, or progressively work backwards until the appropriate stage is reached.

#### 5.4. Conclusion

Returning again to the affordances for learning (Laurillard *et al* 1998), we now have a complete picture for learning with an element of tacit knowledge:

*navigation (making the narrative explicit)* is of particular importance to the confident learner who may progress without noticing common errors and need to back-track to trace a problem and find a solution

*goals and sub-goals (to provide motivation)* are provided by the division of the project into critical steps with appropriate common errors to allow the learners to problem solve as they progress where possible

*interaction (to express knowledge)* the nature of such practical tasks demands interaction through doing

*model answers (to refine knowledge)* provided by offering the learners the facility to evaluate the outcome, identify and solve any problems and the encouragement to repeat the task

## 6. Preliminary learning resource design

To test this framework the "slide whistle" project was selected as it offered sufficient complexity to test the theory whilst remaining simple enough to build, test and modify a learning resource within the given time scale. The slide (or swanee) whistle is a simple musical instrument consisting of a long tube with a mouthpiece at one end and a plunger at the other to vary the note. One can be quite be made in a couple of minutes from a straight, freshly cut twig using no more than a pen knife.



*Sycamore "slide" whistle*

The first stage of the process was to become a learner myself, having watched my partner, Robin, making them on several previous occasions, but not having tried it for myself. Whilst demonstrating, Robin tried to make explicit the knowledge he had, but when I attempted the task myself it became evident that there were areas of tacit knowledge of which he was unaware and it took several attempts until I was successful.

I then made many more whistles, subtly modifying them in a variety of ways to discover why some whistle better than others and how they can be altered for the better. This process was an interesting example of a good use of constructivist learning towards the "pure discovery" end of the spectrum. Having gone through the cognitive phase watching Robin make a whistle, I addressed the associative phase without any further guidance. Whereas it might have been quicker to accept guidance at this stage, to construct the learning resource it was actually useful to encounter and overcome as many problems as possible. This knowledge was recorded by taking extensive notes and photographs, and then used in the construction of the first draft of the learning resource.

In order to involve learners in developing the structure of the resource, the "cardboard computer" methods of Ehn and Kyng (1991) were adapted to provide an accessible and easy to manipulate graphical model of the learning process (appendix IV). This was then evaluated with both an experienced and novice learner and the

feedback used to modify the proposed design, which was then constructed using Macromedia Director.

At the cognitive level, the learning resource provided a short video of the complete process. Initially key information was provided alongside the video, but the feedback suggested that people would have a tendency to listen to the video whilst reading the text so miss the beginning of the video, so this information was provided as a voice-over to the video instead.

At the associative level, the project was divided into six critical steps, each with either a video clip or annotated photograph and supporting text and diagrams. At the "remove bark" stage where there is an easily identifiable common error when the bark splits, a help section was provided so the learner could identify the cause of the error and be encouraged to try again.

A "how does it play?" section was constructed to encourage the learner to evaluate how well they had done make them want to make another, better one. This provided the learner with audio clips of a "good" whistle and four different "problem" ones with which to compare their own. Each problem whistle had an associated help area which could be used to identify the cause of problem and suggest a remedy if one was available, or if not, suggest strategies when making the next whistle.

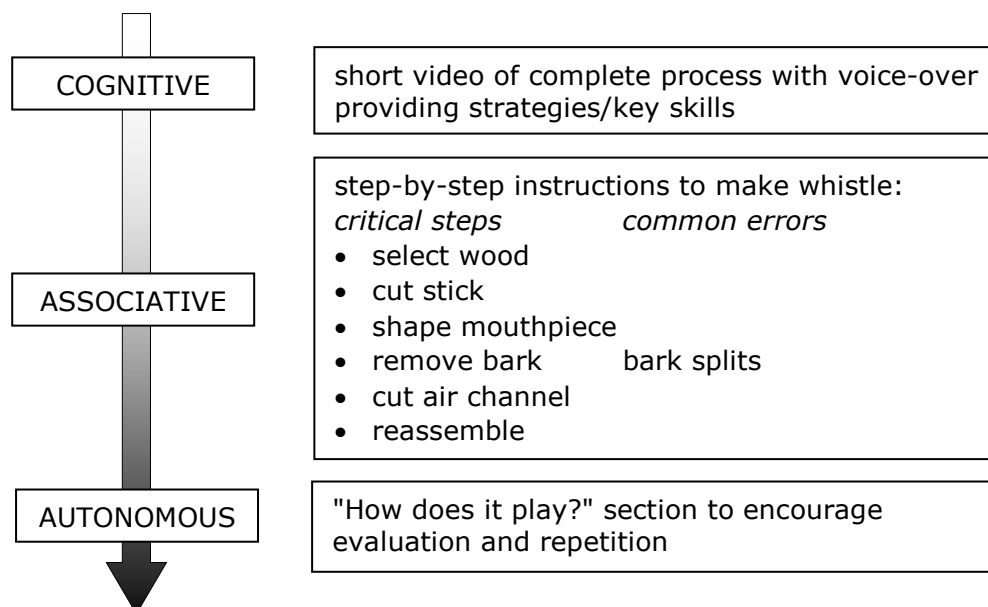


Fig 7. Phases of learning for slide whistle

With the relative simplicity of this project, its narrative structure is linear, so the navigation was also kept simple as a series of numbered stages. The learner's current location is shown in red, previous stages in black and following ones in grey.

Forward and back buttons are provided to allow the learner to move sequentially, or the numbers can be clicked on to move directly to a stage.

This learning resource was then tested with two learners, one familiar with the project who was also involved at the "cardboard computer" stage, and another who was completely new to it, though familiar with my work. Observing their use of the resource lead me to conclude that the basic structure was sound, but highlighted several areas where wording or graphics needed clarification. These changes were made before the resource was tested with learners completely new to my project and this kind of work.

## **7. Questionnaire design**

### **7.1. Skill assessment**

James Atherton (2002) points out that any interaction between a learner and teacher (or learning resource) is a dynamic situation depending on a range of variables including the learner's motivation, level of skill and preferred style of learning. I had observed this on the basket making course, where some learners were keen to move ahead without watching the teacher, whilst others regularly sought additional support before attempting a task themselves.

To assess the learners' level of skill and see if this had any bearing on their use of the resource, I designed a questionnaire to be completed before starting (appendix V). The two main skills of relevance to this project were manual dexterity and familiarity with computers.

The learners were firstly asked to rate their general manual dexterity as poor, OK, good or excellent; four choices being offered to deliberately make them think and have to take a stance. They were then asked how often they used five different kinds of knife (Stanley knife, penknife, cooking knife, scalpel, wood knife) with the three options; never, sometimes or frequently, and similarly how often they did five other activities (sewing, car repairs, gardening, DIY, decorating). The aim of this was to gather information that could be used to independently gauge the learners' manual dexterity, should their performance with the learning resource not reflect their own assessment.

Finally, they were asked how often they used computers for five different activities (word processing, computer games, spreadsheets, email/internet and other things) with the same three options; never, sometimes or frequently. This again was to assist with the evaluation, should some learners have greater difficulty with using the resource than others.

To make the questionnaire more visually interesting and to provide quick association to the question being asked, relevant pictures were provided next to each option, either of the item concerned (e.g. Stanley knife, scalpel) or of a relevant tool (e.g. secateurs for gardening, paint brush for decorating).



## **7.2. Feedback**

To compare with my own observations of the performance of the learning resource, I designed a questionnaire to be completed by the learner at the end of the session (appendix V). This asked the user to rate on a scale of 1 to 5 the break-down of the task, the navigation, the video controls and the help section, each with a box for other comments as well. As the learner had the option for additional feedback, it seemed appropriate to allow them a five point scale with a neutral middle position. They are also offered a box in which to write any other relevant comments.

In addition, they were asked if they thought they would make more whistles and if so, if they felt they would need to use the learning resource again. It is intended to follow this question up to see if any of the learners have gained enough knowledge from the learning resource to construct the rest unaided. I suspect that, whatever their intentions, they will run out of time as the wood is only in a condition for whistle making until the end of July and they may have forgotten too much by next season. If so, this will provide an opportunity for further use and evaluation of the resource.

## **8. Evaluation and modification**

Four learners were used for the second-stage evaluation, two male and two female. It had been my intention to use people with a good range of different skills, but upon comparison of their first questionnaires, it emerged that their skill levels were actually reasonably similar, with two rating their manual dexterity as "good" and two "excellent". All had a broad familiarity with the use of computers, though none had any experience of computer-based learning and did not really know what to expect.

To summarise my observations and the learners feedback in the categories used on the questionnaire:

### **8.1. Break-down of task**

All four learners failed to gain much overall comprehension of the project from the first video clip provided, although they all watched it right through. This initially surprised me as the previous two learners had not had this problem, but I concluded that they had both watched me making a whistle and handled whistles I had made prior to using the learning resource. This seems to prove the theory that in order to move through the cognitive phase of learning the learner needs to be provided with an effective overview of the process. Whilst my overview showed the stages of making, it failed to explain sufficiently the final product to set the making in context.

To overcome this problem a new step was made following the video clip showing pictures of a whistle at each stage of its construction with brief descriptive text. To address another issue raised by one of the learners, the named parts of the whistle in this section are highlighted in green. When you move your mouse over the highlights, a circle appears on the relevant part of the photo and brief, descriptive text appears.

Although none of the learners commented upon it afterwards, three out of the four seemed to find the first section, selecting the wood, rather obvious and almost floundered because there was too little to do. This section has now been combined with the next, cutting the stick. The learners felt comfortable with the length of the following steps and my observations confirmed this.

## **8.2. Navigation**

The learning resource has a simple numbered navigation bar, showing the current step in red, previous steps in black and following ones in grey, with back and next arrows at either end. I observed that initially the learners lacked the confidence to start to use it, but once underway they seemed to be comfortable with understanding their relative position and moving around. On the learners feedback forms they confirmed this, all rating the navigation either 4 or 5, with one commenting that it was easy to use once they had found it.

As a result of this, in the revised version instructions are included after the first, overview, video clip has been watched for the learner to “use the numbers on the green bar above to go in detail through each stage of making a whistle”.

## **8.3. Video controls**

For the steps where video was provided, brief supporting text and pictures were given alongside, and at the bottom of the text was a “play video” button. It was anticipated that the learners would read the text, play the video, and then attempt the step. In reality, none of the learners were keen to engage with the video, they all read the words, looked at the pictures and then attempted the task. Finding themselves unable to progress they then asked me for help, at which I prompted them to watch the video. Three out of the four learners repeated this for following stages as well.

This mirrored the observed behaviour of the more confident learners on the basket making course who were keen to undertake steps before the teacher had finished demonstrating, trying to move to the associative phase before the cognitive phase had been completed.

In the revised version, the text alongside the video only offers the learners a brief description of what happens next, for example “loosen the bark and slide it off the top of the twig” followed by the button instructing “play video”, ensuring that they complete the cognitive phase. Once the end of the video clip has been reached, the supporting text and pictures appear allowing the learner to attempt the associative phase.

Two users found need to replay video clips and both commented that the tool bar beneath the video was easy to use once I had brought it to their attention. To address this problem, after the first (overview) video clip has been played text instructs the learner that “at any stage you can use the controls at the bottom of the video clips to pause, play and rewind” with an arrow to the appropriate tool bar.

#### **8.4. Help section(s)**

The help sections were used and favourably received by all learners. Two of the four found it harder to remove the bark than anticipated and suggested that a further help section to cover this would be of use. This has now been included; it explains that the ease with which the bark can be removed varies greatly from tree to tree and offers a series of steps to work through to locate the problem.

#### **8.5. Conclusion**

Whilst the basic structure (navigation, critical steps, common errors and outcome evaluation) of the learning resource worked well for the learners, there were problems at the cognitive phase both for the overall project and the individual steps that slowed the learners down.

To address the cognitive phase for the overall project a step has been added to show photos of a whistle at each stage of the process and to give a glossary of names of parts. Changes have also been made to initially inform the learner of how to use the resource. To address the cognitive phase for the critical steps that involve video clips, the resource has been altered so the learner has to watch the video before gaining access to explanatory text and pictures.

Whilst it would have been ideal to re-test the learning resource with the revisions, by this stage it was unfortunately too late in the year for the bark to come off the wood and the project had to cease.

## 9. Conclusion

The model of constructivist learning developed through the observation of craft teaching produced an effective framework for the construction of a simple multimedia learning resource. Testing with a small number of learners demonstrated the need for learners to address the cognitive (passive, observational) stage before moving into the associative (active, participative) stage to gain an overall understanding of what they were doing before they attempted to do it. It highlighted the observed problem that learners in this context are impatient to move to the associate phase before they have fully grasped the cognitive phase and that the learning resource needs to take account of this. In much the same way as Laurillard (1996) had to deny her learners access to model answers until they had expressed their own knowledge, in this learning resource access to how to undertake the task had to be withheld until the learners had seen what they were going to do.

It seems that the essential part for gaining the tacit portion of the skill is achieving sufficient repetitions to enter the autonomous phase of learning. My observations of craft learning lead me to believe that much of the motivation to complete a task and repeat it is provided firstly by the ability to recognise and solve common problems mid-task and secondly by the ability to evaluate the quality of the finished item and understand how it could have been improved upon. To this end, where there were common errors for steps they were highlighted, with solutions where appropriate, and at the end of the task an evaluation section was included to allow learners to assess their outcome before repeating the task. With the short time period available for this project, it was not possible to fully test these elements, but early indications were favourable.

A further outcome of the project was the identification of a workable template for data gathering for evaluating the learning/teaching of practical activities. This involves semi-structured interviews with the teacher and learners, audio-recording the interviews to allow conversations to flow unimpeded by note-taking. Use of an additional learner with knowledge of the research being undertaken allows greater access to the learners' perspective, through structured pre- and post-course interviews with this person, again making use of audio-recording to allow subsequent analysis. Finally, the observation of the learning situation takes place, using discreet video recording so as not to interfere with the learning situation, backed by stills photography and note taking, looking for subtleties which might be missed by fixed-

point video. Transference of the video onto DVD facilitates analysis and further review.

This research opens several areas for future research, particularly the need to perform an extensive review of training in related, practical fields such as medical training, flight simulators, sports science, catering and music/dance/drama. Also to date my research has been undertaken with craftspeople who are also teachers, but another area of research would be working with craft practitioners who do not teach to identify the tacit portion of their knowledge of which, by its very nature, they tend to be largely unaware. Finally, there is a need to apply the framework developed in this research to a more complex skill to develop and refine both the navigation and problem solving areas in this context.

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# Multimedia Archive of traditional craft skills

Nicola Wood May 2002  
MA Design (Interactive Media)



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## Introduction



*Tate modern ... a new use  
for an old building*

*"Listing is not intended to fossilise a building. A building's long-term interests are often best served by putting it to good use, and if this cannot be the one it was designed for, a new use may have to be found."*

English Heritage web site

Whilst the produce, tools and film/photographs of traditional craftsmen's\* work are often preserved in museums, the skills themselves are gradually being lost. The original purpose of many of these skills may no longer seem significant to modern society, but they represent as important a part of our cultural heritage as our listed buildings and as such are worthy of preservation.



*Coppice craftsman  
Bill Hogarth 1929-1999*

My aim is to design a framework that can be used to record craft skills on multimedia, not just as an archive, but also as a learning resource with the desire that they shall inspire people to learn and develop traditional crafts.

The main body of this report is in two parts. Section I outlines what I mean by traditional craft, why it is important to record it and how these skills were traditionally taught. Section II covers learning theories and how they relate to multimedia as a learning resource, with particular reference to the observational studies of the Open University's Multimedia, Education and Narrative Organisation (MENO). They identify four multimedia design features that afford effective learning; navigation, goals, interaction and model answers.

Section III contains an additional piece of work, considering techniques for evaluating learning

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\* Whilst nowadays it is seen as politically incorrect, I shall continue to use the term *craftsman* in this paper in its traditional meaning; a skilled practitioner of a craft, irrespective of their sex.



*Video as a learning  
resource*

resources and the results of a contextual observation session; using a video as a learning resource for a craft skill.

I conclude that MENO's affordances for learning are applicable in a crafts skills learning context with some adaptation. In particular, to enable the learner to refine their knowledge, the concept of giving model answers needs extending to providing a section on solutions to common problems.

Finally I outline the next phase of my research, which will involve studying the interaction between traditional craft teachers and learners then producing and evaluating an experimental craft skill learning resource.

# I Project Background

## 1.1 What is traditional craft?



*Oak swill  
basket maker*



*Besom broom maker*



*Hedge layer*



*Knife grinder*

At this stage, when my interest is more in how than what, I will not attempt a definition. Instead I offer some examples under general headings:

### Domestic utilitarian artefacts

This is my primary area of interest, encompassing such items as basketry, pottery, wood turning & carving, furniture making, textiles (spinning, weaving, dying), knitting, tapestry making and clothes making.

### Food and farming

Traditional farming involved many techniques, such as binding, stooking and rick making, and the making of specialist implements such as farm carts, besom brooms and rakes. Closely linked are the skills involved in food production; for example cheese making, milling, butchery, beer and cider making, cooking and baking.

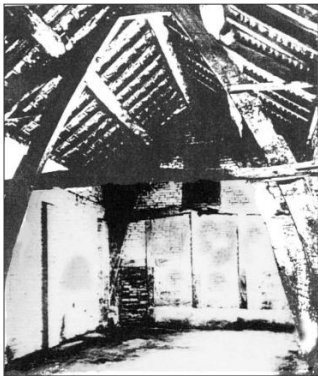
### Building and landscape

Local building styles and materials play a leading role in Britain's distinctive regional character. Traditional craft skills employed for buildings include thatching, timber framing, stoneworking and brickmaking, and for landscape include coppicing, pollarding, hedge laying and dry stone walling.

### Industrial

Many small-scale industrial makers could be considered as traditional craft practitioners, such as Sheffield's "little mesters" who made knives, scissors and other tools associated with the steel industry.

## 1.2 Why is traditional craft important?



*Cruck barn*

### Heritage skills

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*"It is fundamental to the Government's policies for environmental stewardship that there should be effective protection for all aspects of the historic environment."*

DCMS web site

English Heritage preserves buildings through their listing procedure as "powerful reminders to us of the work and way of life of earlier generations" (EH web site) and English Nature designate areas Sites of Special Scientific Interest because "ever growing pressure on our landscape and countryside ... [lead to a need to preserve this] ... increasingly precious part of our natural heritage" (EN web site).

The traditional crafts have played an important role in shaping this part of British cultural identity but at present there is no means of preserving them.

### Building and landscape skills

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*A thatcher at work*

*"The United Kingdom's heritage is, in part, the product of generations of skilled labour."*

Heritage Lottery Fund (2002)

These generations of skilled labour are gradually being lost through lack of investment in training and an undervaluing of skilled craftsmanship, nowadays viewed as mere manual labour.

The most obvious result of this is that it is becoming increasingly difficult to find the skilled craftspeople required to maintain and repair our traditional buildings and landscapes (Heritage Lottery Fund 2002). Without these craftspeople many ancient and historic sights will become irreparably damaged or have their unique character spoilt by modern repairs.



*The Major oak*



*Ancient pollard at  
Hatfield Forest*

For example, many ancient trees have been lost through the loss of knowledge of pollarding, the technique of harvesting timber from a tree by cutting its limbs about 10' above the ground. The original purpose was to provide a regular "crop" of wood whilst allowing grazing underneath the tree, but it also prolonged the trees life (Rackham 1989) so that they became significant landscape features and valuable parts of the ecosystem. Many celebrated ancient trees are pollards; for example the Major oak in Sherwood Forest and the Doodle Oak in Hatfield Forest. Ancient pollard trees are inevitably hollow in the middle and, far from being a sign of weakness, this is thought to be a vital part of the trees life cycle (Ancient Tree Forum 2002). Sadly, once these trees cease to be pollarded their over-heavy limbs tear the hollow trunk apart. Attempts to preserve the tree by propping up the limbs, binding the trunk with iron straps or filling it with concrete have a relatively short-lasting effect or damage the tree further. Experiments with re-pollarding mature trees at Hatfield Forest in Essex and Epping Forest have shown that this is not a simple procedure; indeed it is a new skill to be learned.

### The spirit of craftsmanship

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*"Art made for the people and by the people, a joy to the maker and user"*

William Morris (1891)

Almost since the Luddites started machine breaking there have been calls for men to turn away from mechanical methods of production or they will become little more than a small part of the great machine they are working.

John Ruskin (1853) observed the result of increasing mechanisation on the workforce "... they have no pleasure in the work by which they make their bread,





*"The Leader of the  
Luddites"*

and therefore look to wealth as the only means of pleasure."

Much inspired by Ruskin, William Morris started a revival in the traditional crafts, both with the products he made and the Arts and Crafts communities he inspired. His interest too extended far beyond the product that was being made; indeed it was his unease with the usefulness of what he was creating that lead him into Socialism. In his article *The Socialist Ideal: Art* (1891) he suggests that, whether things are made by hand, machine or both, they should contain "some spirit of the handicraftsman". He also calls for a return to products having meaning, where "nothing which is made by man will be ugly, but will have its due form, and its due ornament, and will tell the tale of its making and the tale of its use" (MacCarthy 1994).



*Morris's looms at  
Merton Abbey*

Whilst their idealism proved influential on many new artist/craftspeople, in reality they had little impact on the broader spectrum of traditional craft. By the time Thomas Hennell worked on the "Recording Britain" project for the Pilgrim Trust in 1940 such crafts were in steep decline or had died out (Whiting 2002). Hennell's vision for the future was for a revival of traditional crafts instigated by "pioneering and idealistic individuals" rather than institutional patronage.

## 1.3 Traditional craft teaching



*Learning to milk*



*"New Lyn Copperworks"  
SA Forbes 1908*

### Informal apprenticeship

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Many rural crafts were handed down through the generations, the process often starting in childhood with the simplest of tasks and progressing as age and dexterity allowed. Products made in this way were what Christopher Alexander (1968) called of an "unselfconscious culture", where design was based on a long line of tradition rather than an individual's ideas. In such societies Alexander suggests that "making is learned informally, through imitation and correction." and this system of design based on frequent repetition of making and gradual evolution over time lead to forms that were both functional and aesthetically pleasing.

### Formal apprenticeship

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Under a formal apprenticeship the student was contracted to work for a set period of time, usually around 7 years, with a master. During this period they learnt the trade, starting from the very basics. They then became a journeyman and could practice the craft, but not teach it until they had sufficient experience (London Apprenticeship Abstracts web site). In many trades they would have to submit their "masterpiece", a showy, non-functional piece designed to show their mastery of the craft, to their trade guild to become accepted as a master. In France these traditions still continue, with masterpieces exhibited in such places as the Musée du Compagnonnage, Tours.

### Teaching knitting

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As an experiment, I have been teaching JoJo, my 8-year-old daughter, to knit. I was taught to knit by my mother at a similar age, as she was by hers. In my grandmother's day knitting was an essential craft skill





*Kaffe Fassett*

as clothes for babies and small children were, for many people, inaccessible or prohibitively expensive. By my mother's generation most girls were taught to knit at school and most continued to knit baby clothes, but commercially made items were starting to become available. In my generation, the skill has become virtually redundant as children's clothes have become so plentiful and cheap. Whilst there has been a minor revival of interest in knitting through the work of Kaffe Fassett, whose innovative use of colour has turned a simple jumper into an art form, the craft otherwise continues to decline. So, by teaching JoJo to knit, I feel to be continuing a long-standing tradition as well as gaining valuable insight into traditional craft teaching.

The teaching process involved two key elements; firstly teaching techniques, secondly building self-confidence. To my surprise, the former was harder than the latter. The knitting technique involves two basic stitches that, once mastered, need some minor adaptation to produce different textures and shapes. Although I can knit well, I found these techniques had become so internalised that I could not describe how to do them. The more I tried to explain, the more uncertain I became, and I had to take the needles in my own hands to see what to do.



*JoJo knitting*

The other input required was confidence building; sometimes the need to help solve problems, but more frequently providing reassurance that all was well and it would get easier with more practice.

### Tacit knowledge

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Polanyi (1966) refers to this internalised knowledge as *tacit* knowledge and it forms a substantial part of the traditional craftsmen's skill, where their understanding is based on a complex variety of feedback, such as the sound the tool makes and the feel or colour of the

material being worked with. In addition, often the simple act of thinking about the process can destroy the knowledge, which is why such skills have traditionally been learned through imitation rather than formal teaching.

These could prove fundamental problems when designing learning resources, but will be further investigated during the next stage of this project when examining the interaction between teachers and learners of traditional craft skills.

### Zen education

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*Buddhist master*

Learning traditional craft skills has many similarities to the informal side of Zen Buddhist education. Whilst formal subjects *are* taught in the Buddhist monasteries, the core of the spiritual element is acquired through “non-teaching”. Rather than reading and thinking, spirituality is gained through everyday daily life and living alongside great masters.

One of the key tools used to invoke the student’s insight is the koan, a saying or act by a Zen master which is usually “of a paradoxical nature and cannot be grasped by the intellect” (Mitsuda 1998). Through thorough immersion in the Zen way of life, the meaning of these koans becomes apparent.

In relation to traditional craft, there are key skills that can be learned in a formal manner, but some skills are similar to koans and their relevance will only be revealed once the learner has sufficiently immersed himself in the craft.

## 1.4 Traditional craft resources

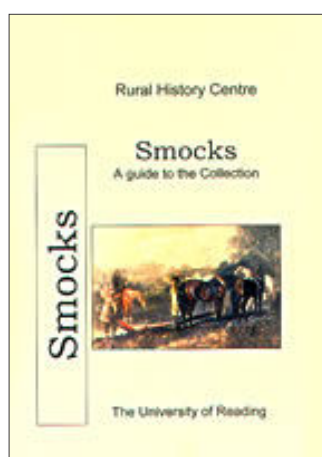


*Basket maker at the  
Ulster Folk Museum*

Most archive material is held in a series of “rural history” museums throughout the country. Of particular significance are the major collections at the Museum of English Rural Life (Reading University), the Museum of Welsh Life (St Fagans, Cardiff), the Museum of Scottish Country Life (Kittochside, East Kilbride) and the Ulster Folk and Transport Museum (Cultra, Co. Down). They act as repositories for a wide range of traditional craft associated artefacts, from simple agricultural implements to whole farm buildings, as well as housing vast collections of associated pictures, documents and audio/visual recordings.

### Museum of English Rural Life (MERL)

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*MERL publication*

Whilst these archives contain much useful information, the task of trying to piece together evidence for how something was made is complex. I recently visited the MERL archives and talked to their Archivist, Caroline Gould. They have a database on the University intranet to assist researchers, but much information is still on card indexes and inadequate storage space means the collection is dispersed and it can be difficult to access the material referred to. They also have a large film archive that is not fully catalogued as specialised equipment is needed to view it due to the age of the film. It is gradually being put onto video, but the expense (£75 per film) means it will be some time before the true extent of their collection is known.

### NEVAC

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The National Electronic & Video archive of the crafts (NEVAC) was founded in 1992 at the University of West of England (UWE) by Mike Hughes, Head of the Ceramics Department. It currently contains 60 hours of video recordings and 110 hours of sound recordings

which are accessible via the UWE intranet. 25 hours worth of the recordings are available for purchase on CD-ROM and some are also technically available via the internet, but the file sizes are such that I have so far always failed to download them.



*Marianne de Trey on the  
NEVAC web site*

Their stated aim is to provide “a resource for those researching the nature of the crafts” (Partington 2000), though to date the bulk of the recordings are of ceramicists, ceramics designers, ceramics collectors and gallery owners who sell ceramics. The emphasis is on the discussion of ideas and inspiration, with very little technical detail about the techniques used, though in a recent usability study (NEVAC web site) revealed that all their user groups would have liked to see more coverage of the practical side.

Their plans for the future are to transfer the existing recordings into a database with attached keywords, making the archive searchable, and to continue making recordings in an ad-hoc manner.

## Books

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Many books have been written about rural crafts, though they are documentary in style, showing in general terms what the craftsman does/did.

Particularly of note are the books *Woodland Crafts in Britain* by Herbert Edlin (1949) and *Traditional Country Craftsmen* by J Geraint Jenkins (1965). Edlin’s book was written when rural craftsmen were still widespread, but by the time Jenkins wrote his book they were in serious decline. Jenkins considers the decline to have started in the 1920s, but was particularly marked from 1945. By the 1960s the remaining craftsmen were the last representatives of their trades and many were lost.

Classic paintings and works of literature can also help add to the picture. The works of Thomas Hardy (1840-

1928) provide a rich description of rural life in this period, for example, this extract from *The Woodlanders* (1887):

*“With a bill-hook in one hand and a leather glove ... on the other, she was making spars, such are used by thatchers, with great rapidity. ... To produce them she took up each gad, looked critically at it from end to end, cut it to length, split it into four, and sharpened each of the quarters with dexterous blows, which brought it to a triangular point precisely resembling that of a bayonet.”*



More recent non-fiction books of note are *Living National Treasures* (Country Life 1997) and *Last of the Line* (Quinn & Felix 1999), both of which document, mostly in pictures, examples of remaining British traditional craftsmen.

## II Multimedia in education

### 2.1 Learning theories

James Atherton (Learning and Teaching web site) suggests that “teaching” as an activity cannot exist in isolation, but must be considered in terms of the interaction between the teacher and learner in the context of the subject being taught. The situation is a dynamic one according to variables such as:

The teacher’s level of skill and preferred teaching style.

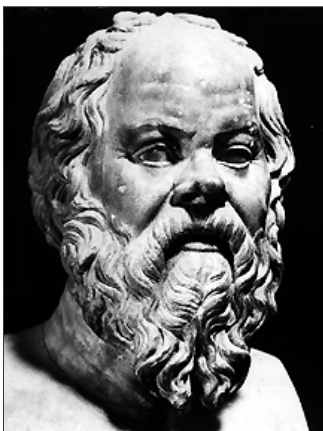
The learner’s motivation, level of skill and preferred style of learning.

The subject; at some stages it could be linear, with the basics needing to be learned in a set order, at others it could allow greater freedom.

The diagrams given below to describe the different learning/teaching theories draw heavily on Atherton’s “Sculpt” models (Atherton 1999) to represent the basic relationship between the teacher and learner, with their vertical position suggesting their relative dominance in the given context.

#### Socratic dialogue

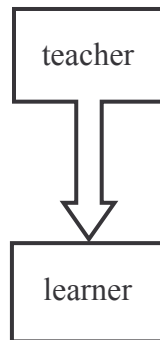
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*Socrates*

Socrates' (469-399 BC) theory was that learning was understanding the "true" nature of things and everyone had the knowledge within them, it just needed drawing out. He gradually guided his students to a level of understanding through careful questioning, though they were required to answer little more than “yes” or “no” to his questions (Laurillard 1996).

In this classic form of teaching, there is a vertical relationship between the teacher and learner, where the teacher is in a dominant position and bestows knowledge upon the learner. The teacher has control



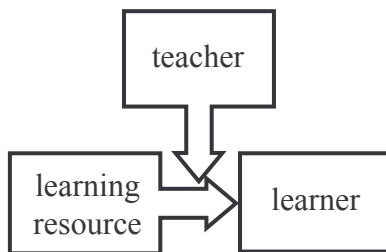
over the subject and the power to select from the material and pass on what he sees fit.

Cook (2001) suggests this is only really suitable for rote-learning set tasks. In the context of learning abstract knowledge this may be the case, but for practical skills it has proved successful for many centuries as the way a traditional master craftsman trained an apprentice.

### Adaptive dialogue

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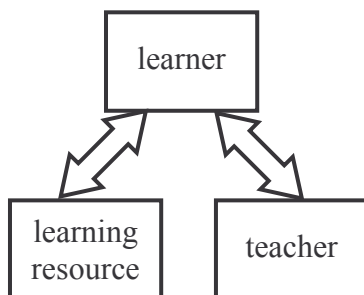
In the adaptive dialogue situation there is a less vertical relationship between teacher and learner. The teacher is still dominant, though their teaching is now aided by a learning resource, which could be a book, a video, an educational TV programme or multimedia disc. The teacher still guides the learning, but now as a mediator between the learner and the learning resource, with the critical point being that the teacher *actively engages* with the learning resource to assist the student's understanding.



### Constructivist learning

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The constructivist learning theory is based on the idea that knowledge cannot exist independently of the knower, but must be constructed through their own understanding of the situation. Therefore the learner should not try to passively receive and store skills and knowledge from teachers or learning resources, but actively construct them (Hein 1991).



The learner is the dominant factor and they use learning resources to construct their knowledge. When required, the teacher's role is to provide guidance in the form of "scaffolding"; supporting the learner by providing the tools with which they can construct their knowledge, but not actually engaging with the learning resource (Yazici et al 2001).





*learning to whistle*

The way in which the learner constructs knowledge depends on the complexity of the task, with a range from pure discovery for simple tasks, to an increasing need for guided discovery for increasingly complex tasks. As an example of pure discovery, my children have recently been teaching themselves to whistle. Their starting point has been observing myself calling the dogs, thereafter it has been endless experimentation until my daughter finally hit upon the right combination and it worked. She is now refining her knowledge through further experimentation. My son still has yet to reach this breakthrough point!

## 2.2 Multimedia as a learning resource

The MENO project (Multimedia, Education and Narrative Organisation) based at Open University has used observational studies of school, college and university students using a variety of multimedia CDs and the sessions have been videotaped to allow detailed analysis of the users behaviour afterwards. In addition, the students have been interviewed about what they found out and their teacher asked to judge how well they have done after each session in order to triangulate the data (Laurillard 1996).



*"The Death of Socrates"*  
Jacques-Louis David 1787

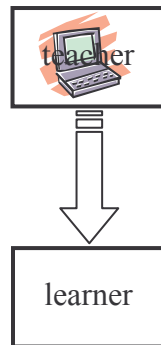
Results of their initial studies using commercially-available educational CDs concluded that if left unsupervised, students "will under-specify the problem, be distracted by irrelevancies, be unsure how to evaluate the information they find, over-generalise from instances, remain unaware of incompleteness, fail to recognise inconsistencies ... there is every opportunity to fail to meet the objective." (Laurillard 1996)



## Why does it fail?

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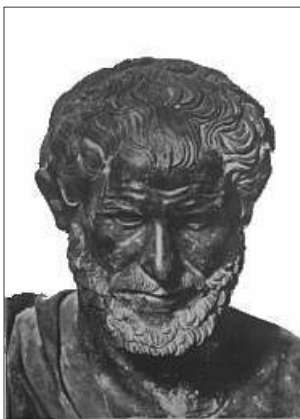
### Dialogue



The multimedia potentially provides students with a rich Socrates-like resource, but it is *they* who have to provide the questions to elicit the knowledge and they scarcely know enough to frame the questions. So, by simply replacing the teacher with a learning resource, the dialogue is destroyed and effective learning not achieved.

### Narrative structure

Educational media, such as lectures, books and educational TV all tend to follow a narrative form. The storyline provides a linear structure that takes the learner sequentially through the material so they can understand its full meaning.



*Aristotle*

This is a device that has been used for centuries. In *The Poetics*, written 350 BC, Aristotle states that narrative events “must be so arranged that if any one of them is differently placed or taken away the effect of wholeness will be seriously disrupted. For if the presence or absence of something makes no apparent difference, it is no real part of the whole” (Plowman 1997).

Multimedia resources are essentially non-linear in form. The learner chooses their own path through the material, leading to the possibility of many different story-lines. Whilst this could be seen as beneficial; the learner has the choice of what they do and in what order; it cannot be guaranteed that they will follow the necessary cohesive, sequential path through the media to achieve their learning aim.

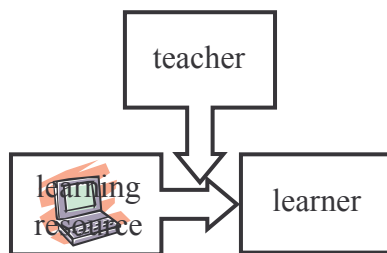


## Cognitive overload

There is also evidence to suggest that learners can spend so much time working out how to navigate the resource that they forget about the task in hand.

Using classroom observations of students using encyclopaedia-style CDs, Plowman (1997) found that the decision-making process involved in searching and navigating the resource took up so much mental activity that there was little left for understanding what was found. This “cognitive overload” was observed with more experienced users as well as novices, as I experience myself sometimes whilst researching on the internet.

## An interim solution



Laurillard (1996) suggests that these multimedia are still very much of value, but should be used under the guidance of a teacher rather than in isolation. With the re-introduction of a teacher, the context becomes an adaptive dialogue with the teacher mediating between the learner and the learning resource when necessary.

## Affordances for learning

“Affordances” is a word taken from the psychology of perception that describes the internal relationship between the perceiver and the perceived. The meaning of the word is most easily explained with a simple example:

a door with a handle affords pulling

a door with a flat plate affords pushing

(Laurillard *et al*, 1998)

So, what design features should be included to afford effective learning?

Following their observational studies of commercially-available CDs and an evaluation of other educational

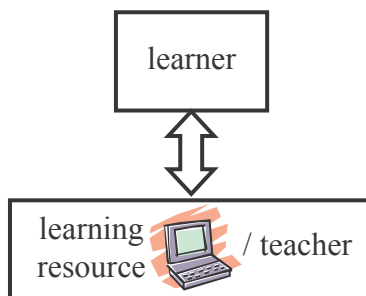




*Aristotle contemplating  
the bust of Homer*

resources, the MENO project made their own multimedia resource for an Open University course learning about the classic writings of Homer. The students were given an overall task to investigate using the text and other resources on the disc, but the narrative was made explicit through a series of sub-goals from which the user could choose. A “notepad” facility was introduced to encourage the user to express their findings that then gave them access to a model answer for comparison.

After putting this through the same evaluation process they concluded that these design elements allowed the students to learn more effectively (Laurillard *et al* 1998).



In terms of learning theory, the learners are now constructing their knowledge using the CD that combines the roles of learning resource and teacher.

The key elements identified by the MENO team to enable this to happen were:

Navigation - to make the narrative explicit

Goals & sub-goals - to provide motivation

Interaction - so the learner expresses their knowledge

Model answers - so the learner refines their knowledge

### III Video as a learning resource

The next question I wish to address is; are the elements identified by the MENO team also the key to the design of multimedia for learning *practical* skills? To gain some insight into the interaction between the learner and the learning resource in this context, I set up an experiment in which a learner used an educational video to construct a practical skill. Prior to this I looked at the evaluation techniques used by other researchers.

#### 3.1 Evaluating learning resources

##### Contextual observation

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Lydia Plowman (1996) shows that originally the design of interactive media was based on that for computer-based training technologies where the user was merely being taught what the right answer was, rather than being guided towards the answer through an understanding of the subject. More recent interactive media have proved more successful because they have followed a user-centred design process and used contextual observation, a user-centred evaluation process, to assess its effectiveness.

The evaluation methods used by both the MENO and the LUMINA research teams have therefore centred on observational studies of school, college and university students (Laurillard & Taylor 1994). They also emphasise the value of including “iterative formative evaluation” in the design process for interactive media, so obvious difficulties can be quickly overcome and more subtle ones can be gradually worked upon.



## Collecting the data

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The main focus of the observational study is watching the user interacting with the media. At this stage video recording of users is vital to allow an in-depth analysis to be carried out following the session and so a permanent record is kept that could be subject to further evaluation at a later date. Lydia Plowman (1999) also recommends taking handwritten notes during the observation sessions on elements that might be missed by the video recording and still photographs showing the positions of the computer and recording equipment to allow further evaluation or accurate replication of the experiment should the need arise.

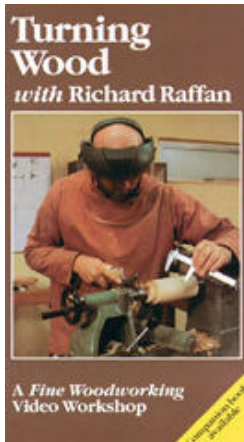
To triangulate the findings, after the session brief structured interviews need to be recorded with both the user and teacher. These should both verify data collected during the observations and add breadth to the data by highlighting elements that might have been missed during the observation (Bowman 1994).

## Analysing the data

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Both quantitative and qualitative analysis can be used with the data from observational studies. Quantitative analysis can determine what path the users took through the material (whether they achieved the necessary narrative) and how long they spent on each element of the multimedia. Qualitative analysis can determine how they responded to the multimedia in the terms of what they said and what they did.

## 3.2 The observational study



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### The subject

The subject used was basic wood turning, chosen as a practical skill for which there are well-developed learning resources.

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### The learning resource

The learning resource used was a commercially-available video *Turning Wood with Richard Raffan*. In total it lasts 117 minutes covering the tools used and how to sharpen them, a series of exercises to practice techniques and projects to apply the skills. In the time allowed for the session it was only possible to work through the tool sharpening and centrework exercises.

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### The learner

The learner was Robin Wood, a professional pole-lathe turner. Robin was chosen because he has a good basic background in woodturning, but the tools and techniques for power-lathe turning are radically different from those he is familiar with.

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### The context

The workshop of a local craftsman, Austin Neves, was used and a TV and video were set up next to the lathe, enabling the learner to frequently switch between the two. To produce an accurate record of the proceedings I took extensive, timed notes and recruited a friend, Giles Bennett, to video the session so I could make notes without distraction. Immediately afterwards I used my notes and the video to write up the proceedings - see appendix I.



*Robin Wood*





### 3.3 The observations

#### Observers comments

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To gain a general overview of the task in hand, Robin spent half an hour watching the portion of the video to be used straight through at home, and then prepared several pieces of green sycamore to turn. Robin spent a further  $1\frac{3}{4}$  hours in the workshop, excluding breaks, of which 52 minutes was spent at the lathe, 38 minutes watching the video and 15 minutes on other activities such as sharpening tools and adjusting the tool rest.

With tasks Robin found more straightforward, he would watch the video briefly (less than a minute), and then spend longer periods (4-5 minutes) on the lathe. With procedures he found more difficult, he would swap rapidly from the lathe to the video and back again (1-2 minutes on each).



Having the video right next to the lathe enabled easy comparison between what he was doing and Raffan's technique. Frequently he would mirror what was happening on the video with the lathe switched off to get the stance and grip correct or freeze the video at a vital point so he could look at it whilst turning.

Unfortunately he often watched the video with the lathe and his facemask on, so it was impossible to hear what Raffan was saying. He did at one stage comment when he switched the lathe off that he wished to listen to what was being said. This meant that Robin was largely basing his learning on the visual process, whereas Raffan later pointed out that, "sound is so important".

The differences between the equipment Raffan uses and those available to Robin caused frequent problems. Firstly Raffan's turning tools were different, leaving Robin uncertain if this was a cause of his initial difficulties, or if it was just down to technique. The tool rest on the lathe was different to Raffan's causing frequent problems and leading Robin to having to adapt Raffan's techniques. This element will have to be taken into consideration when making recordings.

Robin's frustration with navigating the video was clearly evident. He could be seen tapping his foot in impatience as he waited for it to rewind, and sometimes overshot so then had to fast forward to where he wanted. This left some problems unresolved, such as the buzzing noise that the tool sometimes made against the wood, because he did not wish to spend the time looking for the answer.



### Student's comments

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Robin found there were small parts of the video he wished to watch over and over again as he practiced vital moves over and over again. He would have liked to set those portions of video on a continuous loop so





he could look up from his turning at any point to observe what Raffan was doing. He generally found use of the video to be slow, clumsy and frustrating.

He felt that using the video he was learning skills he just could not get from a book, but that the learning process was much slower than if a teacher was there. Particularly in the solving of minor problems, such as getting a clean cut in the bottom of a groove, he would have liked somebody to tell him if it was technique, that his tool needed sharpening, or just the grain in the wood. Effectively he was left at the "pure discovery" end of the spectrum when he would have liked some guidance, although it could be argued that constructing his own knowledge at this stage could be beneficial for problem solving at a later date.

### Teacher's comments

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The original intention had been for Austin Neves, whose workshop was used, to act as an additional observer in the process. He teaches adult education classes in woodworking so it was hoped he would have some useful input, but it very rapidly became apparent that this was not going to work out.

He clearly lacked sufficient confidence in the teaching resource and was worried about Robin doing something dangerous. His unease caused an initial false start; using a piece of dry beech because he considered the green wood Robin had prepared to be in danger of flying off the lathe as it was not very square. We were quite relieved when, just before we started, he announced he had another appointment and could not stay to observe the session.

At a later date I watched the video with Tom Fisher, who also has experience of wood turning and teaching. He felt that overall Robin had made good progress learning techniques, but that at this basic level what

was lacking was confidence building. Being completely without a mentor figure, the student has to look to the learning resource to solve problems and provide feedback, which is where the video fails. As navigation is slow, even if it had the equivalent of "Frequently Asked Questions" it would not be easy to access them to problem-solve.

### Maker's comments

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Email correspondence with Richard Raffan revealed that his initial intention had been to make an audiotape, but the publishers decided on video instead. He considers sound to be a vitally important part of the learning process and an audiotape would have made a portable resource that could have easily been taken to the workshop. The video was first produced in 1985 and has since sold 50,000 copies, far in excess of original expectations.

He also commented that there has been talk of converting the video to CD, but the publishers are worried about too many pirate copies being made.

## Conclusion

Looking at the results in the context of the key elements identified by the MENO team:

### Navigation - making the narrative explicit

As video is linear in structure, the narrative is pre-determined, but problems arose when the learner wished to review sections of the resource or find solutions to problems. The latter were left unanswered due to the lack of effective navigation.

### Goals & sub-goals - providing motivation

The material on the video is well structured, taking the learner through exercises with each tool then providing practical projects to apply the knowledge.

### Interaction - expression of knowledge

In the context of a practical skill, the learner interacts with the task in hand rather than the learning resource to express their knowledge. Having the video next to the lathe was important to enable the learner to consult frequently when addressing a difficult task. A laptop computer with the material on CD would be more portable than video or an on-line internet resource.

### Model answers - refining knowledge

“Model answers” as such were provided by seeing what Raffan produced, but in this context a problem solving section was needed to allow the student to refine his knowledge. In addition, the learner was in need of positive feedback to build confidence. This will be more difficult to replicate on a computer, but a good starting point will be to acknowledge that certain techniques are difficult and that frequent repetition is needed to master them.

## Further research

The next stage of my research will be to examine the interaction between learners and teachers in the context of relevant craft skills.

As identified in section 1.3, traditional crafts were originally taught through apprenticeships, either formal or informal. Nowadays few craftsmen take on apprentices, instead those that do teach run short courses usually lasting 3-7 days. It appears that most learners are “hobbyists”, interested amateurs who wish to make items for themselves or as gifts, rather than looking to the craft as a career. This is often an important factor to the craftsman because, whilst the income from the courses is welcome, training up rivals in business would not be.

Following on from this I wish to produce a prototype learning resource (CD) for a simple craft skill and test it with some users to gain some feedback on the theories I have to date.

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## Appendix 1: Transcript of video evaluation

Morning; spent about half an hour watching video away from workshop, then cut several pieces of green sycamore, roughly squared.

Austin concerned about centring rough-cut piece of green wood and size of them. Says danger of them flying off lathe. Gives Rob some small diameter dry beech to use and shows him how to centre them. Discussion on speed of lathe. RR uses 1400 rpm, Austin's lathe not that easy to adjust, they decide to leave it at 2000 rpm. Later Rob says had discussion with power lathe turner on subject who said that the diameter in inches of the piece of wood times the speed should not exceed 6000, so he felt happy turning up to 3".

Austin's tools mostly different from RR's and did not want the main ones he used re-grinding. Rob decided he could get by with what there was, but first wanted to sharpen the small gouge. Grinding wheel in difficult spot to position tool, managed to clear enough to cope.

Time in minutes: O = other activity, V = watching video, L = at lathe

Lathe: ☒ stop, ☒ start. Video: ☒ pause, ☒ play, ☒ fast forward, ☒ rewind

O	V	L	Time	Comments
	2		12.00	◀◀ to beginning of grinding bit ▶▶ watched through, different tool ◀◀▶▶ watch again.
1			12.02	Ground tool.
	1		12.03	◀◀, ▶▶ watched same bit again, holding tool in front of video at same angle, to directly compare bit, then more grinding.
1	1		12.04	Put bit of Austin's wood on lathe. ▶▶ looking for beginning of lathe exercises, "The problem is having done this grinding bit I'm having to fast forward to the bit where he's turning, but if I ever want to come back to the bit where he's grinding I'll have to rewind the tape for ... 10 minutes."
	1		12.06	Centre work exercises with gouge. Practices stance moves with lathe off whilst watching video on ▶▶. Turning bit starts and by the time he's hit ▶▶ it's gone passed where he wants. ◀◀ and ▶▶ again. RR talks about green cherry "You always want to make sure you've got easy timber to work with doing exercises, there's no point in making life difficult for yourself." R, to video "I haven't!". Practices moves a bit. "I haven't got exactly the same tools as he's got so I'm going to just have to try as it is ..." Practices moves a bit more.
		3	12.07	<input checked="" type="checkbox"/> , <input checked="" type="checkbox"/> starts rounding off
7			12.10	<input checked="" type="checkbox"/> piece of wood not big enough, going to have to use piece of own wood. Rob's concerned because Austin was concerned about it flying off the lathe, but no other option. Giles "We can always sell the footage if it goes horribly wrong!" Giles "Out of interest, where did you learn to do that?" (Squaring up) Rob "Austin just showed me!" Not on video-might be in book? Wrestle with facemask.
		1	12.17	Worried about wood flying off lathe, gives it a quick spin, seems OK, starts turning nervously



O	V	L	Time	Comments
	1		12.18	Video has started playing itself, RW tapping foot impatiently as he waits for it to ◀◀ to where he wants it “it takes a long time to get back to where you want to be”.
		1	12.19	Watching, eventually found bit he wanted, ■, turn a bit, ◀◀, ▶▶ watching, ■, turn a bit, paused on stance wanted, had another go comparing stance
	1		12.20	RR can run his finger all the way along under his tool rest. Austin’s different so Rob can’t.
1		2	12.21	☒ and move rest. ☑ trying with Austin’s big one. Excited noises, big shavings. ☒ “well that felt very professional – and it looks quite good too” ☑ Does a bit more. Another stop, start, much more relaxed and confident ☒.
	4	1	12.24	What’s next? ▶▶ Pencil? Austin comes in. He’s impressed at how well you can see the cutting angle. Talk about rolling the tool. ◀◀ ☒ mark out beads.
1		1	12.29	▶▶ practice moves without cutting. ■ had a go. Swapped tools another go, swapped again. Need to sharpen it - to grindstone.
	1	3	12.31	Back at lathe another go. ◀◀▶▶ mimicking tool motions away from lathe, then ■ and turning again. “I was actually holding it near the end near the end, here, but watching the video I see he was actually holding it up there which gives you much greater control” Turns a bit more.
		2	12.35	Grimace, not too pleased, but carrying on.
	1		12.37	☒ ◀◀ “Well, it doesn’t look quite like Richard’s but it’s getting there” ▶▶. RR talking about shaving coming off just below centre. Rob says he hadn’t looked where shaving was coming off – have to look. Glancing from work to video. Holding tool up to video.
		3	12.38	■ ☒, have ago. Glances at still on screen several times.
	1	1	12.41	◀◀▶▶ watching motion of tool, ■ then has another go.
			12.43	☒ ▶▶ what’s next. Let’s have a fag <i>break</i> . Talking about differences between his and RRs. “It works well, but the drawback is what I want to do is watch one demonstration, then have a go, then watch the same demonstration immediately again, then have another go, then watch the same thing again, then have another go. That means rewinding and watching and rewinding and watching. What I would ideally like is a loop that I could set in so he is turning cove after cove after cove, so that if that was just going I could leave it playing whilst I was working and look up when I needed. It’s a bit frustrating the time lag in rewinding and if I want to regrind my tool now I have to go back to the beginning. Otherwise I think it works extremely well, I’m learning from it all the time.”
			12.55	“I think one thing that’s worth saying, although this is working well and I’m comfortable with it I do feel that the instruction is very slow compared to when Austin was here or if there was a teacher here who could watch me and just say you want to hold that differently or you should do it this way or that way and correct me as I’m going along. It would be a very much faster process than what I’m going through, but in the absence of a teacher this is probably going very much better than if I had a book ... you just couldn’t get the skills I’m looking at from a book.

Time in minutes: O = other activity, V = watching video, L = at lathe

Lathe: ☒ stop, ☑ start. Video: ■ pause, ▶▶ play, ▶▶ fast forward, ◀◀ rewind



O	V	L	Time	Comments
	1		12.57	◀▶ practicing movements with lathe off.
		4	12.58	■ ☑ start making beads.
		3	1.02	"I'm sure when I get that buzzing noise there's something going wrong, but I'm not sure what it is, it probably tells me somewhere else on the video, but I'm not sure. I'll have to watch the video all the way through when I'm home and find out.
	1		1.05	◀▶ "mine doesn't look like that". ■ turning again.
	1	2	1.06	◀▶. "This is one of the best bits when you see the tool close up like that." ■ Turning again. ▶▶, watch bit more video ■, turn ... repeated several times.
			1.09	☒ "I can't get a crisp cut into the bottom there and I'm not sure if it's technique or my tool's not sharp enough or what, but anyway it doesn't look like that". Break.
		4	2.25	Mount new block of wood. "That looks fairly scary" ☑ Turns with increasing confidence using gouge. "Oh yes, the professional turner."
	1		2.29	◀▶ to skew exercises ▶▶
1			2.30	■ "He just reminded me there, I've got to move my tool rest"
	2		2.31	▶▶ practicing with lathe off. "I'm not sure which way he's got his chisel there". ▶▶, practicing again with lathe off. ■ move tool rest again.
	1		2.33	▶▶ Repeating RRs words and practicing moves ■
		2	2.34	☑ turning very hesitantly, then with increasing confidence. Bad dig in. Becomes hesitant again.
	1	1	2.36	Another little dig in. ▶▶ watches a bit ■ then has another go.
	1	1	2.38	◀▶, ▶▶, ■ where it's showing how RR is holding the tool. Turning again. Keeps glancing at screen.
1		1	2.40	Bad dig in. Turns again tentatively. Another bad dig in. "Very scary". Thinks about doing more then decides to move rest closer ☒.
		1	2.42	☑ Turns a bit more.
		1	2.43	☒ Adjust rest again. ☑ Turns a bit more.
	1		2.44	◀▶ and watch again closely. Really concentrating hard on what RR is doing. ■ Thinks about turning, but doesn't actually do it.
1	1		2.45	☒ "I've scared myself now with this big dig in and I'm trying to work out why it happened. When I start the cut just here it's very difficult and looking on the video he's actually cutting much ... the tool rest is much higher ..." ▶▶ ■. Tries to get tool rest higher, but it's difficult to get it that high.
		2	2.47	☑ spends a while turning. Pauses, feels work, looks thoughtfully at paused video, turns again.
	1	1	2.49	☒, feel work, "I'm pleased with that". ▶▶ V grooves. ■ ☑ "One last cut down".
	1		2.51	◀▶ "I think he just pokes it in sideways which feels a bit dangerous, so I'm just watching it again."
	1	1	2.52	■ has a go, at first scared to stick it in. Has a tentative go then ▶▶ again, glancing at tool in hand. ■ on close up. Starts turning again. Looks pleased.

Time in minutes: O = other activity, V = watching video, L = at lathe

Lathe: ☒ stop, ☑ start. Video: ■ pause, ▶▶ play, ▶▶ fast forward, ▶▶ rewind

O	V	L	Time	Comments
	2		2.54	⏏, ⏮▶ again to listen to what he says whilst he's doing it. Intense concentration on screen.
	1		2.56	Looking at grip and practicing with lathe off. Concentrating on screen again.
		5	2.57	■ ▶ cut grooves right way along without going back to video. ⏏ "That works, what's next".
	2		3.02	▶ glancing from video to lathe. Practicing with lathe off. RR is working over and over beads along the line so does not have to keep stopping and rewinding. "Looks easy" ■
	2	5	3.04	▶ starts cutting beads. Gets about half way along. ▶ and turns a bead with it playing, then ■ at appropriate stance and turn some more. Looks at video and adjusts hand hold. Turns more. ▶ ■ and compares how he's holding tool. Does same again. Has a little dig in, but gets straight back on.
	1		3.11	⏏ ▶ look at peeling cut. Practicing with lathe off. "That looks as if it could be scary, but I'll give it a go" ■.
1	2		3.12	▶ little dig in, does a bit more, big dig in, does a bit more, big dig in "uh-oh!" ⏏. Work has come a bit uncentred. Hits it with a big bit of wood, "Don't think we'll bother with the peeling cut." ▶, blasts it away with the big gouge.
			3.15	<i>End of session.</i> Totals: Other = 15 mins Video = 38 mins Lathe = 52 mins Total time = 105 mins

Time in minutes: O = other activity, V = watching video, L = at lathe

Lathe: ⏏ stop, ▶ start. Video: ■ pause, ▶ play, ▶▶ fast forward, ⏮ rewind

## Oak Swill Basket Making - Owen Jones - 11-13 October 2002

## Tape 1

Split into 3 groups; S & RW - O & P - R, G & M to cleave wood into billets ready for boiling.		
01.09	S&RW	splitting spelk lengths, uncertain if they're OK. Put them in a heap until Owen comes around
01.26	O&P	O asking OJ about taking out heartwood. OJ says need to split it in half again and gives strategies for running out, but doesn't actually do it himself.
02.12	S&RW	Owen comes to see what they've been doing, some good, one could be OK if you've not enough material, but isn't ideal. Will put them through so they can experience what it's like trying to rive through it - no point in using perfect material or you don't learn what limitations are.
03.40	O&P	O is struggling – it's running out and he's losing confidence. He tells OJ who steps in and tries to correct it and fails, so suggests an alternative strategy – using the cleaving break.
04.10	S&RW	Struggling with a difficult bit. OJ comes over and takes over – what I'd do is .... and does it. Still not quite up to quality, but will put it through so they know why.
05.10	RG&M	Struggling. OJ says stop there and calls group around to watch whilst he splits it with wedges.
07.40	RG&M	Doing fine, but OJ comes in to suggest a different way of doing something that he finds better and says why.
08.06	S&RW	S has first go with taw length – can't get it to split. RW says he thought OJ held it lower so he could use knee, but still difficult.
08.12	S&RW	OJ approaches – are you OK? S – how did you do it? OJ talks her through without doing it.
08.43	S&RW	Suggesting alternative strategies – using knocker handle until can get bobbin in. Talks about dangers of getting fingers stuck. Encouraging straight back.
09.30	S&RW	S getting there (about half way down) how to finish it off? R tries to force it apart with hands. OJ takes it off him, explains how to do it with froe without actually doing it and gives it back to S. S finishes it.
10.08	S&RW	OJ – right into 3 with that now. Then walks away.
10.19	RG&M	OJ watching what they're doing for a bit then suggests a way of doing better then moves on.
10.40	O&P	O asks where it's best to split it. O explains what he's looking for and alternative approaches. Says what he'd do, but lets O do the splitting.
12.33	RG&M	Steps in and set up wedges again, but R actually does splitting. OJ watches a bit.
13.03	O&P	O not sure and looking up for OJ. OJ comes over, answers question and walks away, but O calls back.
13.38	S&R	OJ say he thinks its going nicely, S nearly puts a piece in the finished heap and OJ calls her back. He admits this is beyond their understanding and shows them where in the basket that length would go so suggests they split it in half again.
14.58	O&P	Watches P, says good, then suggests that he'd cut it at that length.
15.20	S&RW	OJ watching S and suggesting running out strategies. Says he'll be interested to see how well the material works, still after 15 years he's not sure how good it'll be until he actually starts working with it.
16.22	S&RW	OJ explaining the concept of "cracky" to S. Then picks through the pile and points out any he thinks could go in half again.
17.40	GR&M	OJ pointing out the colour difference between the wood they're using and S&RW's – and saying some coloured wood is very good, but it's one of those things he's never tried to put any science on.
18.30	S&RW	RW saying if he was at home he'd take that bit off with an axe
18.39	O&P	Owen saying that's OK, but with the next piece he'd tend to go in from the other end – he'd probably forgotten to mention it, but should always try to go in from the same end.

		Will find out tomorrow that it makes the riving easier if you have clean edges to work from.
19.22	GR&M	OJ standing watching – making encouraging noises. Still giving help with the decision making process with background information.
20.50	GR&M	OJ warns group that it's going to be a difficult piece – it's quite knotty.
21.00	S&RW	RW calls OJ's attention to a knot and he helps them decide – saw it down to a spelk length – talks of constantly moving goal posts – they have enough saw lengths, so don't need to try hard to get more.
22.04	S&RW	Asks them to have a go with another log. It's the top of the piece that GR&M had and has a completely different feel. OJ decides what lengths they still need and tells RW where to cut it.
23.47	GR&M	OJ briefly looks at them they ask and he offers advice.
24.27	S&RW	S asks advice and OJ runs through the decision process for her.

Selecting hazel rods and shaving down ready for steaming and bending into the bool.		
25.26		Chatting outside – can't hear
26.56	O	OJ looks at him and says "that's enough – no more off, but that's fine" then carries on chatting with RW
27.27	M	Calls to OJ – "what's the first bit again?" He tells her, then sees she has a difficult piece of wood and advises her on what to do
28.01	M	OJ "Do ask if you can't remember" and walks away. M "All I'm doing is taking the top off" as he's going. OJ "Yes"
28.07	S/O	S asks a follow-on question as M is still speaking which O attempts to answer then OJ comes over and explains in greater detail why she's doing what she's doing.
28.28	O	OJ looks up and says that O has taken enough off where he's working, then comes around and looks in greater detail and gives more advice.
28.42	M	Calls OJ over to see if hers is OK. Yes it's fine. She asks for confirmation of what's next. He affirms, then watches her and advises on a better way to hold the tool.
29.11	O	Calls OJ over – is it OK? OJ has a good long look. OJ helps him to visualise where it's going to bend so where he needs it thinner.
29.56	S	Her turn now – she's been watching the interaction between O & OJ. He says it's OK, but she's taken a little bit more off than he would have done. He's sure it'll be fine.
30.35	M	Calls out to anyone who can hear "How thin are we going?". O comes over with his and shows it to her. She says OK and carries on.
31.17	M	OJ comes over to see how she's doing and watches for a bit without comment. Goes off briefly to ask the others to be careful with the drawknife blade on the metal tongue on the mare. Then returns to watch M a little more. "That's it" he says encouragingly.
31.55	M	OJ takes it off the mare for a closer look. "Yes, that's good – you need a bit more off there". "Sometimes you can turn it over and take a bit off the other side"
32.32	G	Calls OJ over. Which way up. Owen looks for a while then give his opinion and says why.
33.19	OJ	Feeding bark to the goats and discussion with O about the meaning of the word bool.
34.06	M	OJ looking at M's again and telling her what to do next.
34.25	G	OJ goes over – is everything alright over here? G's cut his thumb and needs a plaster!
35.10		Goat nibbling bark off bits of wood.

35.29	Preparing spelks – OJ demonstrating. Refers them to the hand out for the names. RW picks up the basket to see where its going. All the time OJ is shaving just a little bit then bending then shaving then bending.	
37.00	M asks if its that shape for a reason and RW shows her where it's going in the basket. OJ says that until you start making the basket it's difficult to see why things need to be the way they are.	
37.17	OJ passes the one he's finishes to P to feel what it's like. Starts on next spell.	
37.56	There's a fine line between being flexible enough and being too thin.	
38.08	G asks what happens if you hear it crack. OJ giggles – it depends really – sometimes its just a few	

	fibres going – sometimes its structurally gone.
38.52	M says this one feels bendier than the other one. OJ thinks for a moment – then says that so far they've all been from different trees. Some bits feel bendy however thick they are, others (tend to be from higher up the tree) have a more cracky feel.
39.56	OJ the shape's less important (we can just do that with a knife afterwards) it's the feel that's important.
40.45	Kessen – using the natural curved shape of the wood.
41.05	Putting slats in context of where they came from the pieces of wood that were split. This one was split latways and has a different feel to it.
42.26	G asking about the difference in splitting – we didn't do any of those this morning? Hasn't understood OJ – they haven't actually done that stage yet.
43.12	P passes the kessen to RW – he asks if P noticed it felt radically different. P says it feels smoother – OJ agrees and says it also looks different. RW says he doesn't think it feels any more bendy. OJ can't explain why the bend feels different and moves along.
44.02	This one has lumps and bumps – makes it difficult with draw knife – have to duck and dive around them.
44.45	Explains his general approach – pick it up and bend to get a feel for how much needs to come off before start shaving – then shape it, so he's not so much to shave
45.05	RW shaking his head. M comments that he does it quickly. RW says unbelievably fast. OJ says it's what comes with time. He says the nice thing is that there's no right and no wrong. All the time he's thinking is that good enough?
45.42	Decides to do one to illustrate what's not right. Greatest source of error – is whittling – concentrating on smoothness of action and it goes too thin. There's not a whole lot of difference, though. O asks if you could still use it. O says you could get away with one like that in a basket, but it would be a weaker basket if they were all like that.
47.32	O asks if what you're after is for them to be as thick as they can go and still be able to take the bend. OJ says the one he has is ideally too thick and that the ideal is one has greater definition on the shoulders, it's strong enough to hold its own shape as you weave around and can still be moulded and manipulated.
48.45	Will now set out the ones he's made for them to see and they can make their own.
50.00	Discussing shape again. OJ says it's not critical because no two baskets are the same and you refine the shape as you put it in the basket.

50.52	Demonstrating dressing taws.
51.16	Looking at basic piece of wood – it's a standard piece – a bit rough and has a split. Split it in two. Piece off the side is big enough in its own right.
52.05	Shows them one way of doing it. Says dressing tars is the hardest part of the process to get fluent with.
53.10	RW asks what it is he's looking for. OJ says it's got to go around the bool so its got to be able to do that and he twists it twice around his finger. Then he says he can feel by how it kinks and bends it back on his hand.
53.33	He says he hasn't touched one end and he passes it around so they can feel there's not that much difference in feel. He says this is because it's such good material and its well riven it just needs cleaning up. And it's easier to do it on a thin piece than a wide piece too.
54.08	Takes up another piece. Bends it – this one needs a bit more off. Tries to bend it around his finger then passes it around so they can feel it before he starts.
54.50	All the time you're trying to lead the material up to actually make the baskets as fluent and easily as possible. The more well dressed your material is, the more even it is, the easier it is to weave.
55.15	Shows a different way to do it – said when he first started he found this way quite difficult, but it allows greater adjustment for uneven pieces.
56.10	There are knots in the piece and he says you can rive through them, but it just makes it hard to dress it. The better the raw material the easier it is right the way down the line and you can really gain time in the making.

58.00	O asks about split ends. It's a pain more than serious – you haven't destroyed any of the fibres.
58.43	The broader ones are more difficult. You can just half them if you want. M asks if width is less of an issue. OJ says he needs different taws of different widths for different places and he knows by eye how many of each he needs.

## Tape 2

0.00	OJ bending his and others watching. Explaining what he's doing and how he's responding to the material.
1.50	The bark's coming off – not really a problem, but it makes it more difficult to see what's going on. Thinks the reason is that it's fresh hazel. He would normally dry it on top of his boiler lids for the afternoon and bend it the next morning.
2.40	O asks if they would have used a peg. OJ says that back a long time ago they may have bound it because the cost of the nail might have been prohibitive.
3.52	Peels the bark off – it's just cosmetic really. Should cut the hazel in March, dress it and leave it to dry before you bend it. It would need a fraction more steaming.
5.04	Inside making it into a dish shape. RW amazed at how hard he's bending it.
5.37	The shape is very important. It has flats on it. If you have an odd shaped bool that's not symmetrical, however well you weave it you'll always end up with an odd shaped basket. If you've got a perfectly symmetrical bool, no matter what you put on top of it you'll always have an even basket.
6.08	Remember we're not cabinet makers, we're just rustic basket makers, we're not trying to get perfection, but it does help if its even.
6.46	Apologise if he tends to take over at this point, but it's very difficult to say do it just there, that's enough and he wants their baskets to look reasonable at the end of the day, so might imprint his mark on it.
08.00	If it's a thin bool for a small basket would need to leave it to dry in his airing cupboard (ends like an iron hoop) but for bools of this thickness its ok.
08.45	By the end of the afternoon he wants them to have dressed some taws, dressed half a set of spelks and to have bent their bool.
10.18	When you're just beginning, and even when you've done it a lot the main thing to do is to stop a lot and check because there's a tendency to whittle, to keep going and before you know it it's too thin.
10.37	G asks if his is OK. OJ bends it – um – no, that's OK. Just a little bit more off, it's quite a strong one, you could get away with taking a touch more off.
11.46	G – and the ends need to be a little bit thinner. OJ yes the ends need to be able to turn up just on those broad bottom spells – the no 2's.
11.56	O asks if his taw's ok. OJ runs it through his hands bending it and says its OK. Then says well actually, he would get it ready to weave by cleaning up the side and starts to show him how to do it, but explains instead and says he'll let O do it.
12.50	G asks if his spelks OK. OJ says it needs a bit more just at the end, but otherwise its OK – it's a good strong one. G asks what about the shape? O says he'd actually make it parallel and trims it with his own knife.
13.25	S asks about hers. Looks good – just the last bit at the end needs doing.
13.39	Are you alright there P? Picks it up and bends it. It's starting to get a bit thin. One or two like this in a basket are Ok. Picks up one he's made earlier and gets him to bend it into the U shape, then bend his own. What you're saying is how thick can I leave it and still be able to bend it?
14.50	Are you alright there M? OJ feels it. Just a bit thinner.
16.15	OJ outside with G bending bool. OJ watching G bending. OJ that's it – think about the twist, if you need to twist it.
17.14	OJ just tweaks it to the right position then explains where he want to put the next peg in and that G just needs to treat it gently so it doesn't kink.

17.45	OJ repositions the nail. Talks him through finishing the splice, explaining why at each stage.
19.20	Good, that went pretty well, you picked a nice sized bool to do really. i.e. Good materials = easy job.
19.40	Back inside OJ showing M dressing taws again. O asks about kinks in his taw. OJ says they can actually be quite useful – will see tomorrow.
20.10	M running through what OJ told her as she does it and it works. She tries standing up – can't get comfortable – sits again. It's actually working very well. O asks for hints and she says it's the firmer hold on her knife
20.43	P asks for advice. OJ says he'll show him and gets onto the mare. He shows the grip and what he does.
21.33	Looks at S's. It's a bit fine, but it'll be OK.
22.35	Outside bending RWs bool. They work together with very few words.
27.10	They get it off the former and have a critical look. A disparity between the two ends of his splice, which is not ideal. There's a bit split out on the outside where there's been a little nick in the wood, which broke out as it bent. It's not a big problem as there's still plenty of strength in the wood. He gets his knife out and thinks about cutting it off, but decides there's a danger of making it worse. Instead suggests tying it with a bit of taw for now and then binding it in with the weaving.
28.13	Splitting segments into final thickness. Starts with some spelk lengths which he's splitting to taw thickness to demonstrate the techniques. Shows one way and stops when he's near the bottom. Run out of knees to hold it with and if he just pulls it might break. He does it – and it doesn't.
29.56	Does another one and shows a different technique.
30.40	Spots that its split out at the side, nearly throws it away, instead trims the side off. It still breaks and he throws it. They're using the spelks that are left over and they're not very good.
31.11	Tries another one. Says that second technique is a more rhythmical way of doing it, but to begin with the first way is easier. Stresses the need to do it the second way at the end or you get a ragged end which is difficult to weave into the basket.
32.22	Just do it once more. Has had hurdle makers on the course who do it entirely differently. There's no right or wrong way – just the final piece is important.
33.00	They all have a practice. Its relying on your thumbs not your eyes to get it right.
34.24	OJ asks if everyone's had a go at a few because they'll find that there are good and bad bits of wood. He wants them to see that essentially it's not difficult to pull the wood apart, it just a matter of learning to control the split. He works on starting the pieces of wood without watching people and fielding just one question for several minutes.
36.30	OJ "Do ask if you're not sure about the end bit". M asks about it. OJ takes the piece off her and shows her the movement without actually doing it. She then does it and it works.
37.10	R asks about riving tangentially and latways (radially). OJ explains at no time offering advice to people working.
39.35	Showing tools used for riving.
42.47	R asks about how long its boiled for. OJ talks about what he does and why and how they could do it if they were just making a couple of baskets at home.
44.20	Starts getting bits out of the boiler.
44.40	Says piece is not a good one. Reminds them of how the day before he'd told them about the importance of having 3 clean edges and this one doesn't so will be difficult to rive. He demos through what they're going to do and why.
45.05	Split it in half ... half by volume ... but decides not to go on with the point!
45.25	Testing it to see which you think is the thicker half – acknowledges that it's difficult to judge at first.
45.52	Having difficulty thinking about what comes next. Has to do it and then tell them.
46.13	And this is important – shows what happens if you don't split exactly in half. Can't over-emphasise the importance of the initial cut in. Same principle all the way through that have to split in the middle. Pause and make sure its right.
47.28	Showing how to judge which is thicker side by twisting the knife. Then shows several different ways of pulling apart when it's a thick piece.

48.08	Looking at the piece – is it thin enough? Bends it. It would take a lot of dressing if you left it, but will it be too thin if you go down again? When you're more advanced you can split into 3, but not at this stage. After he's split it again decides it a bit thin.
49.13	This ones actually a bit thick at this end and a bit thin at that, so you can just run a piece off the side.
50.05	This one really needs to go into 3. Can't make himself split it in half and waste good wood, so goes into 3 and shows how ... it's not that difficult really ... you just need to get your technique sorted first.
51.30	Talks about the atmospheric conditions which are best for doing it then about the importance of it being done wet. It dries out quite quickly because it's hot.
52.15	What actually happens to the wood when you boil it .. he doesn't really know and he thinks it wouldn't actually help him if he did.
53.29	Starts getting pieces out for learners to try. Says it sounds OK as it hits the floor.
53.56	OJ so chose the right end first. M which is the right end? OJ the top ... the one that the froe has done 3 clean cuts on. Then stands and reiterates the process whilst everyone does.
55.30	M struggling. OJ saying knock it down a good 6". M not going far enough. OJ saying a bit more a bit more. OJ decides which is thinner side then tells her where to put her foot.
56.48	O has a problem bit at the end which won't part. OJ says he'd always have a chopping block and bill hook handy and chops the end off. He then says he remembers that piece and talking to somebody when they put it through that it would be difficult.
57.30	OJ if you're thinking should it go in half again pretend you're sitting on the mare and dressing the spell and you want to bend it into shape. You want to end up with a pile of material that needs as little dressing as possible.
57.50	Spots P struggling. Comes over and suggests putting it on the floor and demonstrates how to do it. Does it a certain amount of the way then lets P finish whilst watching
58.40	G asks if his are thin enough. O sighs and bends it and says if you can do that to it its OK (U shape) you're always going to get one end that's a bit thicker because the tree is tapered.
59.02	P asks about his. OJ says it's the bit nearest the heart and its always going to be the scrag end. Could still go in half again
59.15	S asks about hers. Its thicker at one end than other. Take a small bit off and let it run out. If you were just making one basket it wouldn't mind dressing that off with a draw knife, but if you're doing lots you would be creating a lot more work.

### Tape 3

0.00	Riving short taws. Showing it's too high to deal with upright, so lean it out. Pulls and feels as before, starts on ground, then realises it's easy enough to pull in hands. Then shows pivoting against knee. Don't be afraid to turn it over.
1.25	Reminds them that it's important to go down the middle. This is quite a good method for the taws.. Developing their skill now. This way is good, but slow. This way is more rhythmical. Then he has to think about what he's doing and why. Just using knees as vice – not bending it over. Controlling with left hand. Just have to do it really! Just have to practice until you get it.
02.41	Remember that bit at the end – and he shows it. RW grins – he makes it look so easy.
3.00	Bends it – this is like a spelk really – so go in half again for a taw. Wraps it twice round his finger to check its pliable enough.
03.25	So you're working with a degree of urgency to try to produce material before it gets cold.
04.00	Again showing that he pauses and looks carefully as he splits to make sure he's in the middle. Then immediately checks to see which is the thicker side. After a while your ands do it automatically. RW after a while? Yes I think even with what you've done you'll get a sense of it.
05.15	Bending it. This one needs to go in half again. It's a pain scraping them like this. (As they've done things in the "wrong" order, they know what comes next so know why it needs to go in half again.
05.35	Starts to go down again then a potential problem they might have occurs to him. If they're not accurate enough with their first tap in and smash up the end it'll be difficult.



06.35	For a long time he thought that the only way to do the job was to boil the wood and it is the best way to do it on a large scale, but ... and he relates how they do it in other places that he has travelled to and worked with basket makers. Boiling, baking and cooking on an open fire all work, so obviously it's just the heat that's important. He's never experimented himself.
08.28	He's let it get a bit cold and it's not working so well.
08.33	I'm letting you watch some more because I think you can some sense of the technique. I think you sub-consciously pick things up.
09.00	This bit here is a bit thick and it's close to the heart so I'll not split it down again – I'll keep it for the lapping spelk – you'll see later on.
09.15	That one piece of wood made 10 taws and I could have got a few more out...maybe 15. You'll need about 10 to make the basket.
09.45	A problem is that the stuff goes cold, so he'll start with splitting them in half.
11.09	I dare say there's all sorts of quality of material in here, so don't be disheartened if your first bit is difficult.
12.05	It's getting it in right then getting that first pull right and keeping it on line right from the first go that's the crux of the matter.
13.00	You've all demonstrated you're quite capable of doing this, so if you're struggling ... it's the wood!
13.45	S: What do you do if you haven't got a straight end? OJ looks at both ends and thinks, asks for a sharp knife, doesn't use it ... just picks up the split and runs it down a bit.
14.19	Is everyone OK? Yes everyone's OK
14.27	M comments the wood is good. OJ points out that it didn't look anything special, but it is actually from the best part of the tree.
15.00	S asking should she go in half again? OJ bends it and says it's thin in some places ... you wouldn't want a whole bundle like this ... but it's not really thick enough to split again.
15.20	S asks about the other bit. OJ says that being honest, it's actually wedge-shaped. By their earlier actions, they've actually made the task more difficult. You could try to split a small piece from one side. He shows her the safe knife grip and starts it, then gives it back.
16.05	RW picks up a piece from the floor that he's started and not continued with. One of the pieces has split in two lengthways. OJ says to keep on running it down and have two thinner bits.
16.21	OJ watches RW for a bit then butts in, taking it off him and shows him the correct pulling method. As he's watching RW again M waves a bit at him – is it OK? He twists it around his hand – yes. Checks R's – yes OK.
17.02	RWs is a bit of a mess. OJ looks at it then bends it. It's that one ... you get it now and then ... it's quite cracky at the bark. You'll probably find that bit awkward as well.
17.15	S asks about her bit. OJ says quite often the last bit he chucks away. You'll notice a harsher feel to it as you get in towards the heartwood. With the exception of the one RWs got – it's cracky on the outside!
17.50	RW bends his bit. Doesn't look happy. Passes to OJ saying it's not really flexible enough. OJ says yes, you feel you've got to be delicate with it and there's a weak point, but you can't actually go down it again. You could use it ... but you wouldn't want too many like that! ... or the dressing operation would be a pain.
18.57	P's is thick at one end. OJ shows him how to start at the thin end and pick up fibres with a knife that you can split off.
19.27	He gives it back. P peeling rather ineffectively, so OJ sits next to him and shows him the hold again ... but he's left handed and has to swap it over.
20.46	OJ splitting a bit from the boiler. Says it has a silky feel – it sounds good as well. Even the sound as it lands on the floor gives an indication as to how good it'll be.
21.04	There's a limited time they can carry on doing this – only another half hour or so – so don't struggle on with a crappy bit. Get a good bit and get a good feel for it.
22.53	OJ dressing bool. Not taking much off – just making it smooth to touch. If you're not careful you can take too much off.
24.37	Looking at the end of the splice. It's going to be pulled in by the weaving, but it's a little bit "strong" (too thick?) so ... don't shorten it in length ... but thin it down a bit so its bendy. It's annoying if you

	don't do it you can't pull it in with the taws.
25.20	Run your hands around and take off anything that's rough. Your bools are much better, mine's the worst I could find. My bark's come off because it was over-boiled.
25.45	Points out a knot. If he'd trimmed it before bending it would have run out, but it's ok now.
26.55	O is doing his. Pushes on the end of the splice then shows it to OJ who says to still take it down a bit. OJ telling everybody whether theirs is OK or not and everybody only does it once, so no real mastery reached.
28.32	Start making basket. Some discussion of tools
30.37	Look at bool – dish down. Your knees are your vice – and shows different ways of holding it.
31.20	O and S trying to write it all down. OJ says he has a document that he wrote for a book that was never published with the precise structure of the weaving in. He had hoped that if he locked someone in his workshop with the materials they might be able to work it out, but he now has his doubts – anyway they can photocopy it if they want.
32.42	P asks if it matters that his end is split. OJ says it doesn't matter, but it'd probably be easier if it wasn't and gives him another.

**Breadmaking – Ana Balfour – 11/11/02**

1/00.00	Ana starts by introducing wheat. Has brought along some pieces for people to see. Starts with a sample of Emma wheat - equivalent to what was used in Neolithic times - and talks about how difficult was to extract from chaff.
1/02.15	Spelt is other old fashioned wheat and is still used. Discussion of husks and naked spelt.
1/04.00	Old fashioned wheat has low yield so is expensive. Discussion of organic farmer developing good bread-making wheat by cross-breeding varieties with right properties. Modern wheat developed for short straw etc - to suit modern farming practices.
1/05.15	Also suggestion that increasing no of people with wheat allergies might be because it's so messed around with. Some people can manage spelt as it's low in gluten, but not all.
1/06.50	The wheats they use ... inc Maris Widgeon which has been maintained as its useful for thatching - low yield, but straw very valuable.
1/07.22	Explanation of bio-dynamic - their own wheat is bio-dynamic.
1/08.20	Low protein wheat ... and where they now buy their wheat from. Working with farmers they know.
1/10.30	Scientific tests done on wheat before they buy it.
1/12.20	They take a pound of wheat and grind it in a coffee grinder and bake a loaf of bread to see what the taste is like. If that's OK they get a sack and put it through the mill (gives a finer grind) and bake it a few times to see what they think.
1/14.40	What they are looking for - bigger wheat grains means more grain and less bran.
1/15.50	Rye and what it looks like - mostly imported from Germany as it's not grown much here.
1/16.15	Barley - what it's like and allergies.
1/17.20	English wheat - low gluten - most flour is blended with continental to increase the gluten and/or added gluten. Strong flour has added gluten, but don't really need it. Commercial bread makers like extra gluten as they can sell puffy bread.
1/19.00	Discussion of different flours 100%, 85%, white etc and what they are.
1/22.30	Ana going to make some 100% and some spelt whilst they watch, then they'll make theirs.
1/23.50	Health giving properties of wheat.
1/30.40	Ana passes around a tub of flour straight off the mill and it's nice and warm. You can make with cold flour, but it takes the heat out of your water and will take longer to make your bread. Can put it in the warming drawer of an Aga or just on top of the stove.
1/33.20	Sort of bowl. Use a big bowl. Pottery is best as it stays warm. Stainless steel leaches out the heat so is not good.
1/34.00	Not weighing anything out. Different to baking cakes. Can't easily learn to make bread from a book as there are so many variables. It's just a matter of confidence in being able to respond correctly to variation.
1/35.31	Discussion of yeasts - fresh vs dried. Fermipan - genetically modified, but at present only option. Hoping that organic will soon be available.
1/39.37	Ana doesn't like the taste of yeast so she only puts a bit in and makes quite solid bread. Learners need to experiment and decide what they like. Putting a lot of yeast in makes it rise very quickly and hard to handle.
1/42.40	Putting salt in. Most flour taste of nothing at all, so put lots of salt in. Ana doesn't like to put much in because she feels that if the flour tastes good, you shouldn't need to, but you can put in as much as you like. Salt just for taste - don't need to put any in.
1/44.02	Water should be quite hot. Ana recommends half boiling and half cold. If it's actually

	boiling it would kill the yeast, but it can be very hot. They pass it around and all feel it's much hotter than they would have imagined.
1/46.07	Putting the water in - better to make it too wet than too dry to start with. You can always add more flour to dry it out, but adding more water is tricky.
1/46.55	Don't you sieve the flour? No, because it's 100% and you'd sieve the bran out. If that's what you want you might as well buy 85%.
1/47.33	Puts the dough in the middle for everyone to feel how warm and stick it is.
1/48.10	Can you use a wooden spoon? No, it's best to get your hands in there.
1/48.50	It needs to have a rest. You need it - she shows how - don't have to do it for hours - just a little bit. Leave it to soak up the water.
1/50.00	Making spelt. Just small batch. Should sound squelchy.
1/51.12	Adding oil? Don't need to. As wholemeal is very moist it keeps well whatever. It helps it from going crumbly if you freeze it though.
1/53.10	She's not too pleased with the feel of the spelt dough, but leaves it to rest.
1/54.20	The 100% is now not as sticky as it was, but is still a bit sticky. It's what she calls "lively" - soft and pliable. If you love kneading and want to do it for 5 minutes, you can do, but it only really needs a couple of minutes. She's not sure why you were told you had to do it for hours and hours. Maybe it was the old varieties of wheat and that modern wheats are better?
1/57.17	Ana thinks that if more people knew how quick it was to make bread, they would do it and throw away their bread makers!
1/57.47	Tins are very important. Should have double-skin. Loaves get very well cooked on the outside before they're done on the inside in single-skinned tins. Missed the rest. Discussion of seasoning tins so they don't need oiling I think.

## Tape 2

2/00.25	For brown flour need to fill the tin 2/3 full. She puts it in to see if it's about the right amount - it is - then moulds bread. Keeps putting a tiny bit of flour on board - just enough to stop it sticking, but not enough to dry it out.
2/01.09	Encourage it to rise to a nice shape in the tin by moulding it. Pat it out flat then roll it up twice and on the third time make sure it's the same width as the tin before you roll it up and drop it in, fold down.
2/02.14	Paint it with milk or milk and water, then you can stick sesame or sunflower seeds or whatever on the top if you want - if you want it shiny you can use beaten egg. And if you want to cut it you can do so now (purely decorative) but use big deep cuts.
2/03.13	Leave it to rise. Needs to be somewhere warm, if not it will take a long time. It should come up to the top of the tin in a dome above.
2/03.42	Making buns - very good for the freezer. Put them straight into a hot oven from the freezer they'll crisp up. Can make them whatever shape and size you want. They'll rise much more quickly, but have to watch them. In a tin the bread goes upwards. On a tray it tends to spread and they'll all join together if you're not careful. Put them in the oven before they've fully risen.
2/07.07	Is the top of an aga too hot for rising? Yes - if the bottom of the bread gets too hot you can kill it. In the tea rooms they just put it on top of the electric cooker which is warm with the oven on. With an aga or rayburn you can put a cooling rack on top and the tins on that. The heat needs to be underneath or it will rise lop-sided.
2/08.30	It might suit you to make the dough in the morning and cook it later. If you make a cooler dough it will take much longer to rise. It depends on the temperature and the weather as well - you have to work out a system that suits you.
2/09.09	Making cheese bread. The more you put in your bread the longer it will take to rise. Chops a small red onion.
2/10.56	You don't have to knock it down and let it rise again? You don't need to do that.

	English wheat is not so strong - it doesn't have so much gluten - so it's best not to ask it to double-rise and you don't need to do that.
2/11.26	You leave it in its tin all the way through and it takes about 25 minutes. If you try to tip it out and it won't come out it probably needs another 5 minutes - give it a good tap on the work surface and if it doesn't jump out its probably under cooked. If when its out and you tap it, it doesn't sound cooked, then pop it back in without the tin.
2/13.42	Fan ovens - they take the steam out and bread needs steam. Ana recommends putting a roasting tin of water in the bottom. RW finds that with an oven full of bread it generates enough steam and it isn't a problem.
2/17.40	Back to the spelt. It has had a long rest, but it's very adaptable and it should be ok. Mention of somebody who forgot it and left it in the tins until it was coming over the edges and baked it like that. He could have just re-kneaded it and put it back into the tins and it should have been ok.
2/18.18	It's too dry - it might be too late, but you can sometimes put a bit of water into it, but it's not easy. Careful not to put too much flour onto the board. If it is too wet just put more flour in a handful at a time or you can quickly go the other way.
2/20.46	Going to make a batch that is much too wet to see what it's like. Just add a little flour at a time. When you can roll it and it holds together it is fine. When it is ok then get rid of the surplus flour so it doesn't go too dry.
2/26.04	Wooden boards good because they are warm - a plastic work surface or plastic board is likely to be cold.
2/27.55	Passes around the dough - the wet one is fine, the dry one is better, but not as good.
2/28.15	The buns are ready to go in the oven. They don't want to crack. They want 10 minutes to bake.
2/30.55	Ana asks them to decide what flour they want to use and runs through what flours they have.
2/34.34	Trying the buns straight out of the oven. You can't actually cut bread straight out of the oven - it's too damp - the steam has to come out of it and it had to cool before you can cut it. You can break it, though. It's remarkably sweet tasting - it's the taste of the wheat which you get if it hasn't got too much salt in.
2/36.30	Temperature - 400 is not enough for bread - the buns were in about 450. If they are crispy on the bottom they are probably done. If they're a bit soft give them a little longer.
2/38.37	Start with Bill making 100% and RW making special blend.
2/40.08	Sends Derek off to get some water and then everybody can try to judge if it's ok.
2/41.35	Testing water. It's hotter than Robin usually uses, but not as hot as Ana has. D goes back for more hot.
2/42.46	Is this loaf ready? Ana says no - if when you touch it and it springs back immediately, then it's ready.
2/43.00	Is the water hot enough? Still not as hot as Ana would ideally like, but it'll be ok.
2/43.09	RW and B get some yeast out and everybody else can have a say in whether they think it's enough. RW's is seeping through his fingers! It looks like rather too much, but he puts it in anyway! Ana asks him about what he does at home. He says that when he firsts opens a packet the yeast is really lively and he doesn't need much, but when it's been going a few months it deteriorates and he uses more.
2/45.23	Putting salt in - same again - gets everyone to check - they both like salt so put far more in than Ana would!
2/45.54	Water now. RW do I not mix that in first? Ana - no, it'll all mix together when you put the water in. Pour and mix at the same time. RW thinks it's gone way too wet. Ana tells him to go around the edges quickly and down in the bottom. It's actually just right.
2/46.26	Ana gets Bill to look in the jug first and try to anticipate how much he is going to use. Ana getting him to tip the water in more quickly and work it round. RW's worked right first time - it doesn't often happen that way - Bill's is now a bit wet. She tells him to just

	put enough flour on to get it out onto the board. Remember to save a bit of flour to work it with.
2/49.13	Put a tiny bit of flour on the board (no that's not enough) and roll it around to cover the dough and then it'll probably be workable. Bill needs a bit more flour as his is a bit wetter. If it's a bit dry, work some more water in immediately or it'll be a brick.
2/50.22	And what are you both going to do now? RW I'm going to knead it a little bit then leave it to rest.
2/50.46	D if you were making 3lbs would you knead it in one go? Ana yes. Bill needs a bit more flour on his board so it doesn't stick.
2/51.46	It's just right when it feels like a woman's breast!
2/52.13	What's on your fingers - if it's wet you can put it on your dough - if it's dry don't or you'll get hard lumps in it.
2/52.55	Derek and Bunty start. Derek with 100% and Bunty with Miller's Magic. They reckon the Miller's Magic smells nutty.
2/54.06	How's the temperature of the water - not hot enough - Ana goes for more hot.
2/55.20	Ana is going to pop some things in the oven. If you put them in too soon the do what's called "jumping" - the yeast hasn't quite finished working and it finishes in a few seconds in the oven and the top separates from the rest of the loaf. It's quite hard to decide - it springs back when its ready. There's some confusion amongst them about what it should be like. Ana goes to put the loaf in the tea room where it's warmer.

### Tape 3

3/00.24	Bunty asks if she needs more yeast with MM flour. Ana says yes MM made with middlings which are low gluten and rye which is similar. Some people who are slightly wheat intolerant might be able to eat it. Do need to make a really soft dough = lots of water in it.
3/01.10	Derek has been standing for a while with some yeast in his hand waiting for Ana to look. He asks her what she thinks - so she asks him what he thinks - he says that's how much he's chosen and she says that's ok. He doesn't have salt at all.
3/01.30	Bunty asks about salt ... she likes it but is a bit embarrassed to put too much in. Ana implies that what she's put in is not a lot at all and she could actually put a bit more in if she likes it.
3/02.45	Ana's looking at some dough on the table and realises that Bill and RW should be finishing their loaves as they've rested enough.
3/03.10	Bunty and Derek are putting water in and not sure, so looking at each others. Bunty asks Ana if it's a bit dry and Ana says yes ... plenty of water.
3/03.28	Derek asks - Ana asks what he thinks - he says its much wetter than he would have normally made it - Ana says he does need a little tiny bit of flour in there to dry it up.
3/03.55	Ana says to Bunty that hers sounds just right ... nice and squelchy! Bunty says she thinks it feels heavy. Ana feels it and says its fine.
3/04.20	RW asks what he's doing now - is it ready to go into a tin. Ana says yes - does he think he's got the right amount. RW says he thinks 2 buns extra and Ana agrees.
3/05.00	Bunty is patting hers around on the board. Ana mentions to the others that they should knead then mould. Bunty asks how the kneading is done. Ana comes around to show her. Roll the outside in flour. Then flatten it, fold it in and twist with the heel of the hand. She does it in slow motion and recommends Bunty does the same until she gets the hang of it.
3/06.24	She asks Derek if he knows about kneading without checking Bunty's OK. Bunty's only using one hand to flatten and fold and not the other to turn the dough around. Derek shows her how he kneads and she says that it's fine.
3/08.00	Bunty's starting to get the hang of it, she checks with Ana. She is starting to use her other hand to move it around without being told.

3/09.55	Ana comes in with the first loaf she made which has now come to the top of the tin. She's trying to make out that it's ready but Derek tries it and it doesn't really spring back very well. She says maybe it isn't quite ready yet and decides to leave it a bit longer.
3/11.15	Fran's starting on hers. Ana's fetched the hot water. She holds out a handful of yeast and Ana says she could put a bit more in. The salt goes in without comment. Then she puts the water in. She starts with not enough, then puts too much in.
3/13.25	Fran's now having a go at kneading from what she's seen Ana explaining to Bunty, but does not look very confident. When Ana comes in she says "I'm not doing this right, am I?" Ana asks if she knows how to knead and she says no, so she comes around to show her. This time Ana mentions about twisting with the other hand. Fran says that watching everybody else she thought she knew how to do it, but now she's had a go she's not so sure. She carries on with Ana watching and encouraging. Then she says that's enough, takes it off her and pulls it together and says just to leave it to rest.
3/16.20	Derek asks if it's time to do theirs now Ana says yes if it's had 5 minutes. Derek says should they knead it and mould it. Ana says they have to decide how much to put in their tins before they mould.
3/16.50	Ana says that if you mould it and find it's too long for the tin its best to take it out and mould it again rather than squashing it in the tin. If you press it down it'll not rise in a really nice shape. Similarly if it's too small and there's a gap the dough will need to spread before it can rise upwards.
3/18.42	Derek asks if it's ready for moulding and Ana points out that he first has to decide how much dough he needs for the tin. She gets him to cut a bit off then check it's the right amount for the tin before moulding.
3/19.26	Bunty asks if hers is too dry. Ana feels it for a bit, thinking, then adds some more water herself and works it in then asks Bunty if its better.
3/20.09	Derek has dropped his into the tin - Ana says well done, then says that firstly the fold needs to be exactly on the bottom and secondly he has a crack on the top which will spoil the look of his loaf as it rises. Derek asks where the crack comes from and Ana shows that as you knead, the best bit is on the bottom and the crack comes from where the folds join on the top. Need to remember this as your moulding to make sure the crack stays on the top and you roll it up inside.
3/22.07	Bunty's now doing hers. She asks the others what she's to do - RW tells her. I try to bring their attention to the above point. RW seems uncertain, but when Bunty comes to do the next one, he points it out to her and gets her to turn it over.
3/23.35	Derek's now making buns, but again has a crack on one. Ana shows that you have to knead by bringing into the middle, then turn it over so the crack's underneath.
3/24.16	Bunty checks the above point with Ana who confirms.
3/26.43	Bunty's now painting it and realises her loaf is now too wide. Ana tries to describe what she should do, then decides she has to do it herself and comes round and starts rolling it. Then she decides there's not enough dough and gets her to put some more dough with it as the MM doesn't rise as much as the others.
3/28.03	Ana asks Fran how hers is and she says she thinks it feels dry. Ana feels it a bit, then starts kneading. Fran asks if she hasn't kneaded enough and Ana says no, it's just easier to see what its like if she kneads it. Ana says she thinks its ok.
3/28.55	Bunty's remembering to turn hers over so it's crease up when she's moulding. Finally she gets it in the tin and its ok.
3/30.50	Fran thinks her loaf is too long. Ana says drop it in and see, she does and it's a bit long. Ana gives it a shake to see if it'll settle, it doesn't, so she takes it out and puts it back a couple of times until she's happy.
3/31.13	She explains why they paint with milk - it stops it getting too dry as its rising - presumably it will impede its rising if its dry.
3/32.40	Fran asks if she should brush it with milk before you cut it. Bill says you can do.
3/36.39	Ana describes a quick way with buns - can make them and put them straight in the

	oven and they'll do a quick rise there. You have to eat them straight away, they'll not keep like that.
3/38.13	They're all pressing the top to see if they're ready. None of them seem to be yet. Derek asks what happens if you don't put it straight in the oven when it's ready. Ana says because its English wheat it doesn't have much gluten so it'll collapse if you don't put it straight in. That's the problem with using their flour in bread-making machines. They rely on four with lots of gluten that'll stay up for a long time once the yeast has finished working.
3/40.15	RW asks why he sometimes gets a flying crust. Ana says it can be under-proved and the yeast's still working when it goes into the oven. It can also be over-proved slightly and it's started to collapse as it's gone in.
4/41.23	After lunch - looking at the bread. They're amazed by Bunty's MM loaf. They reckon it has risen much better and is a different colour to usual. The miller thinks there might have been a little more wheat than usual in that batch.
4/44.15	Ana tells everyone to give their loaves a tap. The oven was at 450 and they were in for about 25 minutes. She doesn't tell them what they are supposed to be listening for.
4/45.00	They are talking about even good bought loaves being much lighter than these and Ana talks about Shipton Mill and Doves farm blending their flour types so they can always offer a standard product. (They've just bought a boat load of high-protein wheat from Canada to mix in) It's also roller-milled which gives a more homogenous product its really hot when it's milled so it deadens the taste and comes off very powdery (but it does have better keeping qualities).
4/48.15	Ana mentions a French man who baked good sour dough bread which he sold through Waitrose (it was very expensive) he would only use stone ground bread.
4/49.52	Having a go at the new wood-fired oven used by the village bakery for the commercial loaves! Recommends Unicorn Groceries on the edge of Manchester (ask where).
4/53.10	We ask Ana about knowing when it's done and tapping the loaf - still feel uncertain. Ana admits to doing it herself so as not to burn our bread. She says she took it out after 20 minutes and banged the tins on the side and they were still stuck. She went back 5 minutes later and she could tell by the colour and how it came out of the tins that it was ready. Ana says to always give them a bit longer ... better over-done. She recommends making smaller loaves rather than having bread that's doughy in the middle.
4/55.22	Fran says she still hasn't mastered the art of kneading - if she practices, will she get there eventually? Ana says she will, she just needs to carry on practicing in slow motion and then she'll gradually get quicker.
4/56.06	Ana says the most important things about making bread are warmth, giving it a rest and making the dough good and wet. She says to go home and start making soon and don't be too slow tipping your water in. She gives a recipe on a printed sheet as a starting point when they get home.



# *slide whistles*

In the spring and early summer when the sap is rising, these whistles are quick to make and will impress children of all ages!

Sycamore, which grows prolifically, is an ideal wood to use, so is rowan. Most trees can spare a shoot or two without doing any harm, but do ask first if it's not your tree.

The only tool really needed is a sharp knife. A pair of secateurs can also help if you are new to knife work.



# *slide whistles*

1 ... 2 ... 3 ... 4 ... 5 ... 6 ... 7

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complete video of making process right through ... keep it down to a couple of minutes



# *slide whistles*

1 ... 2 ... 3 ... 4 ... 5 ... 6 ... 7

this year's growth  
thin, fresh and  
green-looking

last year's growth  
thicker, with darker,  
more brown bark

## **Select wood**

Choose a straight shoot of last year's growth which has at least 4"-6" between leaf nodes.



# *slide whistles*

1 ... 2 ... 3 ... 4 ... 5 ... 6 ... 7

## **Cut twig**

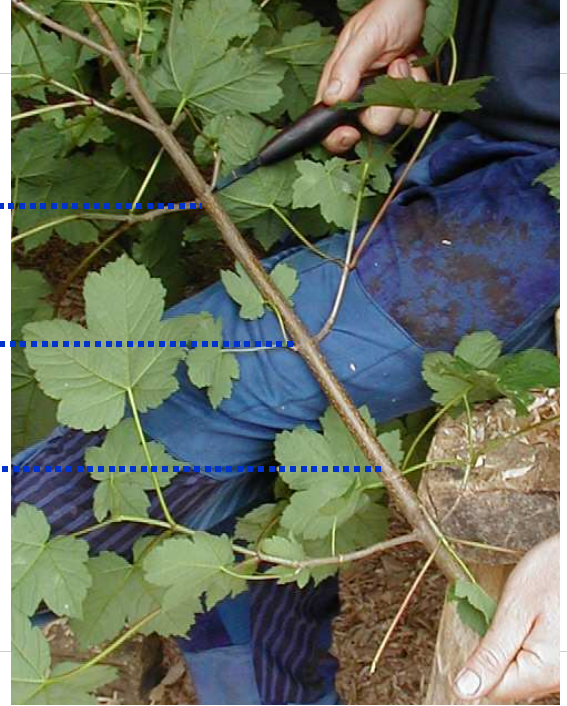
Choose a long straight section for the whistle body and cut off the top of the branch just below the leaf node.

Cut off the bottom of the branch, leaving a handle at least 4" long below the next leaf node.



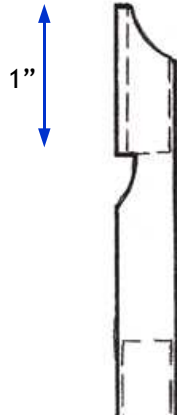
body

handle



# *slide whistles*

1 ... 2 ... 3 ... 4 ... 5 ... 6 ... 7



## **Cut mouthpiece**

Cut the *top* of the branch to a slope with a slight inward curve that fits comfortably in the mouth.

Cut an air hole about 1" from the top.



Maybe a bit of video of this stage?  
or a better close-up photos?



# slide whistles

1 ... 2 ... 3 ... 4 ... 5 ... 6 ... 7

## Remove bark

Cut through the bark to the wood right around the stick just above the next leaf node.

Loosen the bark by tapping it all over with the handle of the knife. (Put the sheath on your knife first!)

Starting by the cut and working towards the mouthpiece, carefully twist the bark until it comes off.



> help ... it split!

This definitely needs a video showing the bashing and the different grips as you twist



# slide whistles

help ... it split!

## split by air hole

- > did you bash enough around the mouthpiece?
- > were you too impatient?  
twist very gradually starting from the bottom, moving upwards - when near the air hole, grasp the whole mouthpiece in a cloth and twist slowly

## lateral split in bottom

- > is the twig the right way up?  
the *top* of the tree should be towards the *top* of the whistle or the slight taper of the twig will split the bark
- > how straight is your twig?  
any serious bends, lumps or imperfections will tend to make the bark tear



> get another piece and have another go ...





# *slide whistles*

1 ... 2 ... 3 ... 4 ... 5 ... 6 ... 7

## **Finishing off**

Mark right around the stick where the top of the mouthpiece was cut.

Cut air channel along long side of the top of the stick, then carefully cut along the marked line.

Slide mouthpiece into top of whistle, lining up with bark. Slide handle into other end and trim to length if required.



This probably wants a video too





# *slide whistles*

1 ... 2 ... 3 ... 4 ... 5 ... 6 ... 7

## **Play it**

Slide the handle in and out as far as it will go whilst blowing steadily to find where the note sounds best ...

> how does it play?

little video clip  
of someone  
playing one



# slide whistles

## how does it play?

### just “windy” sound

- > air hole too big?
- > air channel too big? (insert inside mouthpiece also tends to slide down when playing)

### only low notes

- > air hole too big?  
often it is only just starting to whistle as the handle is coming out of the bark

### only high notes

- > air hole too small?  
if you slide the handle right up to the top so it's behind the air hole you can carefully cut it a bit bigger

### difficult to blow

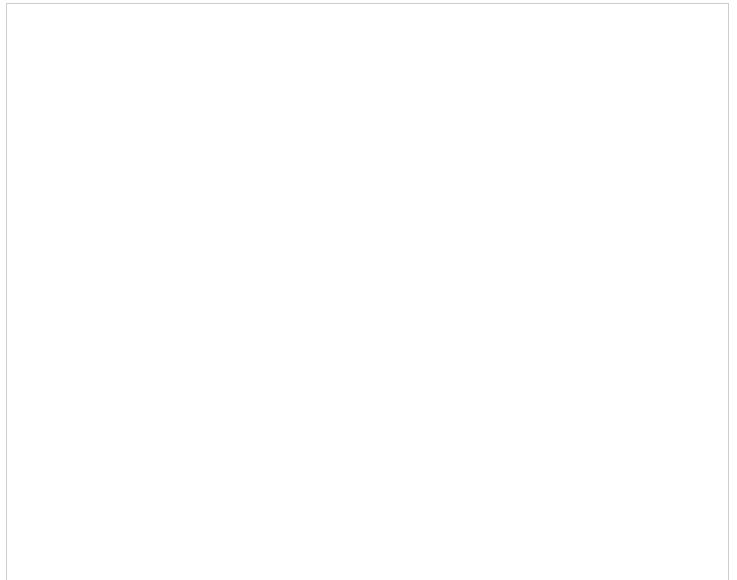
- > air channel too small?



use the point of a knife to gently slide the insert out and cut the channel a bit bigger



if you can taper it so the hole you blow through is larger than where the air comes out into the whistle you get even better results



## Whistle questionnaire 1

date: .....

**1. ABOUT YOU:** name .....

sex: M / F      age: under 20    20-35    36-50    over 50

how do you rate your general manual dexterity?      poor      OK      good      excellent  
    1            2            3            4

**2. KNIVES:** how often do you use ... ?**Stanley knife**

- ☐ never  
☐ sometimes  
☐ frequently

**Penknife**

- ☐ never  
☐ sometimes  
☐ frequently

**Cooking knife**

- ☐ never  
☐ sometimes  
☐ frequently

**Scalpel**

- ☐ never  
☐ sometimes  
☐ frequently

**Wood knife**

- ☐ never  
☐ sometimes  
☐ frequently

**3. SKILLS:** how often do you do ... ?**Sewing**

- ☐ never  
☐ sometimes  
☐ frequently

**Car repairs**

- ☐ never  
☐ sometimes  
☐ frequently

**Gardening**

- ☐ never  
☐ sometimes  
☐ frequently

**DIY**

- ☐ never  
☐ sometimes  
☐ frequently

**Decorating**

- ☐ never  
☐ sometimes  
☐ frequently

**4. COMPUTERS:** how often do you do... ?**Word processing**

- ☐ never  
☐ sometimes  
☐ frequently

**Computer games**

- ☐ never  
☐ sometimes  
☐ frequently

**Spreadsheets**

- ☐ never  
☐ sometimes  
☐ frequently

**Email/internet**

- ☐ never  
☐ sometimes  
☐ frequently

**Other things**

- ☐ never  
☐ sometimes  
☐ frequently

## How was it for you ... ?

*1=hard to use 5=easy to use  
please use the box for comments*

1. Break-down of task 1 2 3 4 5

2. Navigation 1 2 3 4 5

3. Video controls 1 2 3 4 5

4. Help section(s) 1 2 3 4 5

5. Is there anything you needed you didn't have?

6. Do you think you would have a go at making more whistles? YES / NO  
If yes, do you think you would need to use the CD again?